1965

1965-1966 University Course Catalog: The Dayton Campus of Miami University and the Ohio State University

Miami University and The Ohio State University

Dr Gölling.

- GENERAL COLLEGE
- COLLEGE OF SCIENCE & ENGINEERING
- MIAMI ACADEMIC CENTER
- OHIO STATE GRADUATE CENTER

DAYTON CAMPUS

MIAMI UNIVERSITY • THE OHIO STATE UNIVERSITY

'65-66

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ADMINISTRATION AND FACULTY

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ADMINISTRATIVE OFFICERS

Earl V. Thesken, A.M., *Dean of Educational Services, Miami University,* A.B., Miami, 1930; A.M., Miami, 1943.

Edward Q. Moulton, Ph.D., *Dean of Off-Campus Education and Associate Dean of the Faculties, The Ohio State University; Acting Director, College of Science and Engineering, Dayton Campus*
B.S., Michigan State University, 1947; M.S., Louisiana State University, 1948; Ph.D., University of California, 1956.

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Warren H. Abraham, M.S.Ed., *Director of the Dayton Campus for Miami University and Professor*
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Philip Bordinat, Ph.D., *Professor of English and Director, General College*
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Howard E. Bales, B.S., *Associate Director of the College of Science and Engineering; Instructor, Biology*
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Paul M. Biddinger, M.B.A., *Director of The Ohio State University Graduate Center*
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Janice A. Horn, *Catalog Librarian and Instructor of Library Administration,* B.A., Luther College, 1957; M.A.L.S., University of Michigan, 1961.

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Howard R. Jarrell, *Public Services Librarian and Instructor of Library Administration,* B.S. in Bus. Admin., University of Dayton, 1955; M.S.L.S., Western Reserve University, 1958.

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A.B., Miami University, 1962

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FACULTY OF THE GENERAL COLLEGE AND DIVISION OF TEACHER EDUCATION

Ellen Abell, M. A., *Lecturer,* Art Education
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Richard S. Allen, M.A., *Instructor,* English
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Gary Barlow, M.Ed., *Assistant Professor,* Art Education
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Carl M. Becker, M.A., *Instructor,* History
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Henry B. Chapin, Ph.D., *Assistant Professor,* English
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Angélica L. Dean, M.A., *Instructor,* French
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James S. Dean, Jr., Ph.D., *Assistant Professor,* English
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John M. Higby, M.A., *Instructor,* English
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William J. King, Ph.D., *Instructor,* Classics
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Paul E. Lane, M.A., *Instructor,* Speech
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FACULTY OF THE COLLEGE OF SCIENCE AND ENGINEERING

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THE DAYTON CAMPUS

OF

MIAMI UNIVERSITY AND THE OHIO STATE UNIVERSITY

The Dayton Campus of Miami University and The Ohio State University is located in the city of Fairborn on the eastern outskirts of Dayton. This location is adjacent to the Wright-Patterson Air Force Base and is easily accessible to the expanding metropolitan region of the upper Miami Valley.

Although it is operating as a separate campus of the two parent institutions, legislation has been introduced in the General Assembly of the State of Ohio to establish this campus as an independent state university at the proper time. Future growth is dependent upon state funding of the capital plant and the part which this campus will play in the master plan being developed by the Board of Regents. A $3,000,000 science building and a $3,000,000 library and classroom building are now under construction. Both buildings are being built from funds appropriated by the General Assembly and are scheduled for completion by September 1966.

HISTORICAL BACKGROUND

As early as 1926 Miami University began offering courses to students in Dayton. In the early years extension work led an itinerant hand-to-mouth existence, first in the old YWCA, then in the old Central School. In the 1950's course offerings were expanded, organized into definite programs, and institutionalized into an Academic Center with a minimal administration, faculty, and facilities. In 1962 there were over fifteen hundred students enrolled in the one hundred courses of the Dayton Academic Center, by then located in Roth High School.

Immediately after the second World War, in 1946, The Ohio State University first offered to the personnel of the Wright-Patterson Air Force Base graduate courses in science and engineering and business organization, with some offerings in a limited number of other subjects. Classes were held in the Air Force Institute of Technology. After 1960 these courses were opened to the general public, and The Ohio State University moved toward a comprehensive center for graduate education in the Dayton region.

By this time it had become apparent that if public higher education were to realize its potential in the upper Miami Valley, new and enlarged facilities must be provided. This region, which had from the beginning given enthusiastic and ef-

fective support to the university programs, recognized the need and responded by raising three million dollars for the initial investment in a separate campus for state-assisted higher education.

From these contributed funds a 618 acre campus has been acquired and Allyn Hall, the first building, has been constructed. Allyn Hall was named in honor of Mr. S. C. Allyn who, with Mr. Robert S. Oelman, served as co-chairman of the campaign and whose vision and foresight have contributed immensely to the success of this new campus.

A COMMUTERS' CAMPUS

There are at present no dormitories on the Dayton Campus, and there is no provision for the supervision of student housing. Because it is expected that most students will drive to school, ample parking areas have been provided. There is bus service from Fairborn and downtown Dayton to Allyn Hall for those who require public transportation. It is presumed that students not living at home will establish their own living arrangements as adult citizens in the community.

Students of the Dayton Campus have developed campus social life, journalism, theater, art, music, and student government.

Dining facilities are provided by a full range of vending machines.

The program of the campus does not include intercollegiate sports or physical education. However, intramural sports are being developed for the 1965-66 academic year.

THE ACADEMIC CALENDAR

The Academic Calendar of the Dayton Campus divides the year into three trimesters, each being fifteen weeks in length. In the 1965-66 school calendar the Fall Trimester begins September 7 and ends December 18; the Winter Trimester begins January 3 and ends April 16; and the Third Trimester is divided into two terms, the Spring Term extending from April 25 through June 16 and the Summer Term from June 20 through August 11. Credit for a trimester's work is the equivalent of semester credit.

Students—new, transfer, and continuing—may register for work in any term in which appropriate courses are offered.

Dates for Course Changes

The deadline for dropping courses without grade is the close of seven weeks for freshmen and three weeks for upperclassmen.

In the seven and a half week terms, the deadline for the dropping of a course without the grade of "F" for upperclassmen is the Friday of the second week of instruction. For freshmen it is the Friday of the third week of instruction.

Students may change their courses any time within the first two weeks of a full trimester and the first week of a term, provided the consent of the adviser and the instructors is obtained and change of course fees are paid.

ADMISSION TO THE DAYTON CAMPUS

Matriculated Ohio Students

To be admitted as a *Freshman* to the Dayton Campus the Ohio student must have graduated from a first-grade high school with sixteen units of preparatory study, at least ten of which must have been earned in such college preparatory subjects as English, speech, mathematics, science, history, social studies, or foreign language. A transcript of the high school record and an application for admission must be filed with the Office of Admissions, Dayton Campus, Colonel Glenn Highway, Dayton, Ohio 45431. A charge of ten dollars ($10.00) is made when the application for admission is submitted. A high school student should apply for admission during, but not before, the autumn of his senior year.

All entering freshmen are required to take the achievement test (ACT) of the American College Testing Service, either before or during their first trimester on the Campus. This is not used as an admissions test, but as helpful information for the student and the college. Test centers for ACT have been established throughout Ohio. The times for testing should be obtained from high school counselors. A fee of four dollars ($4.00) is charged for the test.

Out-of-State Students

Residents of other states must meet the foregoing requirements for freshmen registration, must rank in the upper half of the graduating class, and must present scores on the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board which indicate better than average ability to do college work.

Transfer Students

The registrant who has attended another college and has been registered for one or more courses is considered a *Transfer Student* and must present a transcript from each college in which he has been registered, regardless of whether credit has been granted or whether he desires to receive credit upon admission. No application for transfer will be considered until a transcript and certificate of honorable dismissal has been received by mail from the registrar of the institution or institutions previously attended. Transfer credit will not be granted for course work with a grade of "D" or lower, and the transfer student must have an accumulated "C" average on all studies attempted.

Students suspended or dismissed from Miami University, The Ohio State University, or another institution will normally not be admitted to classes on the Dayton Campus.

Students suspended for poor scholarship from the Dayton Campus may petition for readmission after one year. If changed circumstances appear favorable, with academic preparation and ability not critically in question, the student may be permitted to return to his studies by action of the Admissions Committee.

Students who have been dismissed for academic failure from other institutions will normally not be considered for readmission until two years have intervened between their dismissal and their application for entrance. After that time the Admissions Committee will decide upon the admissibility of the student on the basis of the likelihood of his success in college studies.

Superior High School Students

Superior High School Students may enroll in some courses given on the Dayton Campus. To be admitted to these courses the high school student must be in the upper one-fourth of his class scholastically, must be recommended by his principal, must have the written consent of his parent or guardian, and must place in the upper one-fourth on aptitude tests administered by Miami University. Further information about this program may be obtained from the high school principal or guidance counselor.

Graduate Students

The courses for graduate credit offered on the Dayton Campus are entered through the respective Graduate Schools of Miami University and The Ohio State University. For their admissions requirements the entering student should consult their bulletins, which may be obtained from the Office of Admissions of the Dayton Campus.

To obtain graduate credit for courses taken on the Dayton Campus a student must be admitted and enrolled in the respective graduate school offering the course.

Matriculated Part-Time Students

Students who register for less than twelve hours of credit in a trimester are considered *part-time students*. They are required to have the same academic preparation as full-time students. A part-time student who chooses to work toward a degree must follow the normal admission procedure.

Non-Matriculated (Unclassified) Part-Time Undergraduate Students

Students wishing to take a few courses without matriculation in a degree program may follow a simplified form and procedure for registration. They may do so until they have accumulated twelve hours credit, at which time they must become matriculated students. This simplified form and this procedure eliminate health information, the application fee, and transcripts of record. No transcripts of previous academic work are evaluated for non-matriculated students.

Transient Students

Students wishing to take a few courses for transfer to another college may do so on the Dayton Campus if they will present an official letter of good standing from the last institution attended.

NOTE: *Mature persons who have reason to believe that their cases need special consideration may petition the Office of Admissions.*

Admission Procedure

The student seeking admission should obtain the application forms and related materials from the Office of Admissions, Dayton Campus, Colonel Glenn Highway, Dayton, Ohio 45431. The procedure to be followed for matriculation is described in this literature.

REGISTRATION PROCEDURE

At the time of registration each student will be advised by a member of the faculty. Selection of courses is subject to the adviser's approval, based upon the general requirement of the University or the division, in the light of the specific interest of the student.

Each new student will have a temporary adviser. However, after the initial registration, the student will come under the guidance of an adviser assigned according to the curriculum the student is pursuing. The adviser will ordinarily be a member of the department in which the student expects to major.

The dates of registration are announced in the calendar printed in this catalog. Students pre-registering are billed for fees up to four weeks before the opening date of each trimester. Registration after that date requires payment of fees at the time of registration.

Evening students will be registered and advised on the dates announced each trimester in the schedule of evening courses.

No registration will be accepted after the second scheduled meeting of a class.

PAYMENT OF FEES

Students will be billed at home until approximately 4 weeks prior to beginning of classes. After this period, students are urged to pay fees at time of registration, to avoid lines and delay.

A late fee of $5.00 per calendar week will be assessed for students paying after the dates set in the Academic Calendar.

No registration or payment will be accepted after the second scheduled meeting of a class.

Class admission cards must be called for prior to attending classes. Without these cards, which will be available upon presentation of a receipt for paid fees, students will not be permitted to attend classes. If fees are mailed, with bill, the receipt and class cards will be available the first day classes begin.

A payment made with a bad check will result in the cancellation of the student's registration until the fee is properly paid. An additional charge of $2.00 is made in such case.

For various reasons, The Dayton Campus cannot defer the payment of fees or accept partial payments. Those students who cannot pay their fees at the time of registration should make arrangements with some outside agency to obtain the necessary funds.

Students may apply for National Defense Student Loans. This should be done at least 60 days prior to registration.

When Registration Fee Certificates are presented in payment of registration fees, an additional charge (to be announced each trimester) will be made. Registration Fee Certificates are non-transferable and may only be used by the person to whom they were issued and whose name appears on the certificate, or a member of the immediate family.

To provide an additional receipt, it is to the student's advantage to pay by check or money order, made payable to the Dayton Campus.

FEES AND EXPENSES—1965-1966

Full Time Undergraduate Students

All fees and charges are due and payable on a trimester basis after registration is completed and before the opening day of classes.

Expenses *for each trimester* are listed following. All fees and charges are subject to change.

Registration Fee $210.00*

*Out-of-state Tuition must be added to this fee by all students who are not residents of Ohio 200.00

Registration Fee for the Spring Term (½ trimester) 105.00**

**Out-of-state Tuition (as above) 100.00

The student must also be prepared to spend from $35.00 to $50.00 each trimester for textbooks and other supplies.

Part-Time Undergraduate Students

For students carrying fewer than 12 credit hours in a given trimester, the registration fee is $18.00 per credit hour. Out-of-state tuition is an additional $18.00 per credit hour.

Part-Time Graduate Students

Miami Academic Center .....$21.00 per credit hour
Out-of-state tuition is an additional $18.00 per credit hour.

The credit hour charges for The Ohio State University Graduate Center are determined by annual negotiation with the United States Air Force and will be announced at the beginning of each academic year.

Other Fees:

Change of Course Fee, per change.....$ 5.00
Late Payment Fee .....$5.00 per calendar week
Late Registration Fee .....$ 5.00
Auditing Fee .....same as full registration

Registration Deposit

For full-time entering students a non-refundable pre-registration deposit may be required approximately eight weeks prior to the starting date of each trimester. This pre-registration payment will be applied against the total registration fee which is payable at the start of the trimester.

REFUND OF FEES—DAY TIME STUDENTS

First or Second Trimester

In case of withdrawal or change of course within two days of the opening of a regular trimester, refund of registration fees will be made in full. (At the beginning of a trimester within two days is interpreted as meaning before 4 p.m. on the second day of classes.)

After two days refund will be made on the following basis: before 11 a.m. on Saturday of the second calendar week of the trimester 75%; before the same hour on Saturday of the fourth calendar week 50%; before the same hour on Saturday of the fifth calendar week 35%. After the fifth calendar week no refund of fees will be made. (The first calendar week is interpreted as the week in which classes begin.)

Either Term of Third Trimester

In case of withdrawal or change of course within two days of the opening of either term of the third trimester refund will be made in full.

After two days, refund will be made on the following basis: before 11 a.m. on Saturday of the first calendar week of the trimester 75%; before the same hour on Saturday of the second calendar week 50%. After the second calendar week no refund of fees will be made.

A refund will not be allowed unless the withdrawal is regularly made through the Registrar's Office with the approval of the advisor, and will be computed from the day such withdrawal is reported to the Office of the Registrar.

REFUND OF FEES—EVENING STUDENTS

First or Second Trimester

During the first and second trimester, refunds will be allowed upon receipt of written notice of withdrawal, as follows: In the case of withdrawal before the second class session, refund will be made in full; after the second session but before the third, 75%; after the third session but before the fourth, 50%; and after the fourth but before the fifth, 35%. No refunds will be made after the fifth session.

Either Term of Third Trimester

During either term of the third trimester refunds will be allowed upon receipt of written notice of withdrawal as follows: In the case of withdrawal before the second class session, refund will be made in full; after the second session but before the third, 50%. No refunds will be made after the third session.

A refund will not be allowed unless the withdrawal is regularly made through the Registrar's Office with the approval of the advisor, and will be computed from the day such withdrawal is reported to the Office of the Registrar.

NON-RESIDENT STUDENTS

Tuition Charge for Non-Residents of Ohio

Students attending the Dayton Campus who reside in a state other than Ohio are requested to pay a tuition fee fixed by the Boards of Trustees of the parent universities.

The burden of registering as a non-resident of Ohio is placed upon the student. Any false statement of residence by a student for the purpose of avoiding the proper payment of the tuition fee may result in disciplinary action. Any claim by a student to a change in the facts of residence, or any doubtful set of facts, should be set forth in writing to the Business Manager of the Dayton Campus for his determination.

The following general rules govern the payment of the tuition fee. They have been established by the Board of Regents for all state universities. They are summarized on the next page.

Rules Governing Ohio Residence

A student is an "Ohio resident" if he meets the following requirements:

A. An adult student is considered to be an Ohio resident if he has resided in the state for a minimum of twelve consecutive months preceding the date of enrollment and if he has an evident present intent to remain in the state indefinitely, provided that his residency in Ohio has not been for the purpose of attending a college or university.

B. A minor student is considered to be an Ohio resident if his parents or his legal guardian have resided in the state for a minimum of twelve consecutive months preceding the student's enrollment and if the parents' or guardian's residence during that year has been maintained with the evident present intent to remain in the state indefinitely, provided that such action has not been taken for the purpose of gaining residence status for the minor student.

C. For the purpose of determining residence requirements under these rules, a person will be considered a minor until he has reached his twenty-first birthday even though such person may have been emancipated.

Married minors, however, are entitled to establish and to maintain their own residency pursuant to paragraph A.

D. The residency of a married woman is determined by the rules which would apply to her husband if he would seek enrollment; except that a woman who has enrolled as an Ohio resident may continue to be considered an Ohio resident upon marrying a non-resident, provided her enrollment is continuous and she continues to live in the state of Ohio.

E. A woman who is legally separated from her husband may establish her own residency pursuant to paragraph A.

F. The residency of any student may be reevaluated for each term of reenrollment. At such time, any student who has not been classified as an Ohio resident, must prove that he has met all requirements for Ohio residency as stated in these rules.

G. A student who has been classified as an Ohio resident shall be considered to have lost his residency in this state twelve consecutive months after he, or in the case of a minor, his parents or legal guardian move to another state with the intention of remaining there and making such state their place of residence, notwithstanding the fact that he or they may entertain an intention to return at some future period.

H. Aliens admitted to this country on immigrant visas may establish Ohio residency in the same manner as any other non-resident.

I. Service men and women who enter the service from another state shall be classified as Ohio residents during the period of their active duty assignments in Ohio.

STUDENT FINANCIAL AID

The Dayton Campus endeavors to assist good students in every way possible to meet the costs of a college education. Four resources are available: loans, part-time employment, scholarships and grants-in-aid. Within the limits of funds and jobs, the Dayton Campus desires to help students help themselves.

All forms of student aid are handled by the Business Office located in Allyn Hall. More detailed information about the various forms of student aid and about specific scholarship provisions may be obtained from this office. In general, student aid is extended on the basis of scholarship and other special talent, along with the factor of financial need.

All prospective students interested in possibilities of student aid are urged to write to the Business Manager as early as they can. Usually, all applications for assistance must be received by March 1 preceding September of the year of entrance or enrollment.

ACADEMIC ORGANIZATION

THE GENERAL COLLEGE

All students intending to study for a Bachelor's Degree at the Dayton Campus will enroll in the General College and will remain students of the General College through the freshman and sophomore years. The purpose of the College is to provide first, for the general education of the student and second, for the specific education necessary for entrance to a major area of study.

Each student, therefore, is required to take 36 credit hours of courses from the Common Curriculum. The purpose of this curriculum is to provide every student with a broad understanding of the intellectual heritage of man and some comprehension of the vast extent of his accumulated knowledge. All specialized curricula build upon or around the base of this curriculum. In addition to the courses in the Common Curriculum, the student is expected to take basic courses in one of the major areas of the humanities, social studies, languages, education, or business. If he plans to advance into the College of Science and Engineering, he will take the basic courses in the sciences and mathematics.

THE COLLEGE OF SCIENCE AND ENGINEERING

The College of Science and Engineering provides all of the instruction in science, mathematics, and pre-engineering for the freshmen and sophomores of the General College and for the Academic Center of Miami University, and part of the instruction for the Graduate Center, The Ohio State University. The College also provides instruction and administration for the baccalaureate curricula in science, mathematics, and engineering at the Dayton Campus. Fields of concentration will be provided in the junior and senior years in the following areas: Biology, Chemistry, Geology. Mathematics, Physics, Psychology, and several phases of Engineering. Those students who intend to major in one of these fields or related fields should register for the first two years of their undergraduate program in the General College. Upon completion of their freshman-sophomore program in their fields of interest they will then register for the last two years of their four year program in the College of Science and Engineering.

THE DAYTON ACADEMIC CENTER OF MIAMI UNIVERSITY

The Academic Center provides on the Dayton Campus a program of late afternoon and evening classes as a continuation of the daytime program of the campus. This program has been operated in the Dayton area for many years by Miami University.

In this program courses from the freshman through the graduate level are scheduled. Until a full-scale daytime program of advanced studies is developed on the Dayton Campus, certain upper division and graduate courses will be available only in the late afternoons, evenings, and on Saturday mornings.

In the Academic Center a flexible program operates which permits a student to register as a part-time student, to combine a registration with daytime study, or to register for a full program at night if daytime registration is not possible. The extent of the registration depends upon the amount of time that can be devoted to study. When a student is employed full time, a maximum registration of six hours is recommended. Employed graduate students are limited to six credit hours by regulation.

Adults who wish to complete work toward a degree, to pursue further study for self enrichment, or to qualify for certification will find both beginning and advanced courses in the humanities, social services, education, and business administration. These courses may be taken for credit or may be audited.

The graduate student will find graduate courses in education, business administration, and a number of the liberal arts areas. With few exceptions, the requirements for the master's degree may be satisfied on the Dayton Campus, subject to the availability of courses.

Miami University and The Ohio State University are members of the National University Extension Association.

THE GRADUATE CENTER OF THE OHIO STATE UNIVERSITY

The Ohio State University Graduate Center formerly located on the Wright-Patterson Air Force Base is now located on the Dayton Campus. In addition to Air Force personnel, qualified applicants from the Dayton area are eligible to register as advanced undergraduate and graduate students in this program.

Because the Graduate Center is an integral part of the Graduate School of The Ohio State University, those participating in the program are subject to all the rules and regulations as set forth in The Ohio State University Bulletin with the following additions: all applications for admission as well as subsequent registration must be processed through the Graduate Center, a separate schedule of deadline dates is in effect, and the maximum number of credit hours which may be earned in any quarter is six. Owing to this limitation, the residency requirement for the Ph.D. may not be fulfilled through this program.

Advanced work is available each academic quarter at the Graduate Center in the following areas: Accounting, Aeronautical and Astronautical Engineering, Astronomy, Business Organization, Ceramic Engineering, Chemical Engineering, Chemistry, Economics, Electrical Engineering, Engineering Mechanics, Industrial Engineering, Mathematics, Mechanical Engineering, Metallurgical Engineering,

Mineralogy, Nuclear Engineering, Physics, Physiology and Psychology. Courses are also offered from time to time in other areas upon demand. Course work is identical with that on campus and is given by approved members of the Graduate Faculty. The majority of classes are conducted in the late afternoon, Monday through Friday. There are some low enrollment courses being offered by audio-visual means whereby the classes meet as scheduled on the main campus in Columbus.

Inquiries regarding this program may be addressed to the Director, The Ohio State University Graduate Center, Dayton Campus; or to the Dean of the Graduate School, The Ohio State University, 164 W. 19th Avenue, Columbus 10, Ohio.

THE COMMON CURRICULUM

The Dayton Campus seeks to fulfill its obligation in general education through the Common Curriculum. Every student, no matter what his special interest, selects courses from this curriculum which is common to all programs. The total number of credit hours in the Common Curriculum is 36, less than one-third of the total hours required for a degree.

It is suggested that Common Curriculum requirements be fulfilled during the freshman and sophomore years. The courses in this curriculum are English 11-12; *two social sciences* chosen from Economics 11-12, Geography 11-12, Government 11-12, History 11-12, Psychology 11-12, Sociology 11-12, and Sociology 21-22; *a biological science,* Physiology 11-12; *a physical science* chosen from Chemistry 11-12, Geology 11-12, and Physics 11-12; and *a humanities course* chosen from Classics 11-12, English 31-32 and 41-42, Fine Arts 11-12, History 21-22, Philosophy 11-12, Religion 11-12 and Social Studies 21-22.

If a student takes a more intensive or extensive introductory course in a science than the one listed in the Common Curriculum, he will be credited with fulfilling the requirement of the Common Curriculum in this field. Credit hours in the Common Curriculum courses beyond those specified may be used to fulfill other requirements.

GRADUATION REQUIREMENTS

A student on the Dayton Campus may graduate from Miami University or The Ohio State University through work taken in Dayton. He must, however, meet the graduation requirements of the respective universities, which may be found in their bulletins. General descriptions of the graduation requirements follow, but they should be checked with the latest bulletins of the parent universities.

Requirements for the Bachelor of Arts Degree (Miami)

To be eligible for the Bachelor of Arts degree, a student (1) must have met all the university requirements (including residence, common curriculum, etc.), (2) must have earned a cumulative average of at least 2.00 (C), for all courses taken, (3) must have passed at least 46 credit hours of advanced courses applicable to the degree, and (4) must have completed at least 120 credit hours of acceptable academic courses, including:

I. *The 36 credit-hour requirement of the Common Curriculum.*

II. *The following group requirements* (courses used to fulfill Common Curriculum requirements may not be used also to fulfill group requirements).

Group A. *The Humanities.* Six credit hours in classics, English, fine arts, philosophy, or religion.

Group B. *The Social Sciences.* Three credit hours in anthropology, economics, geography, government, history, psychology, or sociology.

Group C. *Thought and Communication.* Six credit hours in advanced composition, logic, mathematics, or speech.

Group D. *Foreign Languages.* Fourteen credit hours in foreign languages, including 202 or a course in the 300 level. (Courses of foreign literatures in English translation may be used only in Group A.) This group requirement applies to all students entering Miami after June 1, 1962.

III. *The requirements of a Field of Concentration* made up of (1) a *Departmental Unit* of courses taken in a single department or of an *Interdepartmental Unit* of courses taken in related departments and (2) *Related courses* taken in one or more other departments.

No more than 42 credit hours in any one department may be credited toward graduation.

Suggested freshman program—A.B. degree

English 11-12 (cc)	6
Social Science (cc)	6
Biological or Physical Science (cc)	6
Foreign Language	6 or 8
Electives	6 or 12
	30 to 36

NOTE: Courses which fulfill the Common Curriculum requirement are followed by (cc).

Fields of concentration:

CLASSICAL HUMANITIES. *Departmental Unit:* Minimum of 24 credit hours, including one year of college Latin or Greek, any courses in classical humanities, Art 241, 242, History 305.

Related courses: Minimum of 16 credit hours from art, history, language, literature, philosophy and religion.

ECONOMICS. *Departmental Unit:* At least 24 credit hours in economics including 11-12, 301, 415, 417, 421, 422. With the approval of the chairman of the department, hours chosen from Government 241, 242, 315, 316, and 381 may be counted as economics.

Related courses: A minimum of 16 credit hours chosen from Accountancy 201-2, Business 301, 472 (free elective), Finance 301, geography, government, history, Industrial Management 301, Mathematics 119 or 112 or 161, 162 with permission, Philosophy 123, 312, 371, Psychology 11-12, 262, 321, 322, 351, sociology.

ENGLISH. *Departmental Unit:* Minimum credit hours, *Type 2* (The General Major): 26; *Type 2* (The English Major with Certification): 29; *Type 3* (The Professional Major): 32. Courses required of Types, 1, 2, 3: 31-32 and 41-42 (or 321 and 322); 302; two semesters of a period course (401, 402; 411, 412; 441, 442; 451, 452; 491, 492) totaling 21 hours. Special additional requirements: *Type 1:* 3 hours in a type or a regional course (335, 336, 342, 361, 362, 375, 376, 387, 388, 435, 455, 456, 461, 462, 471, 472) and 2 hours in 191, 192, 231, 232, 325-6. *Type 2:* 301 or 3 hours in a type or a regional course, 352, 231. *Type 3 (A) English Literature Emphasis:* 6 hours in types or regional courses; 352; 2 hours in 231, 232, 325-6. *Type 3 (B)American Literature Emphasis:* 6 hours in American literature beyond 41-42 (or 321 and 322); 352; 2 hours in 231, 232, 325-6. The following courses do not count in the departmental unit: English 11-12, 15-16, 21-22, 162, 182, 305, 306, 331, 341, 345, 371, 372, 382, 385, 386, 395, 396. The following courses do not count toward the 42 hour departmental maximum: 11-12, 15-16, 21-22, 162, 305, 306, 341, 345, 371, 372, 385, 386.

Related courses: Minimum of 16 credit hours. (1) *Required:* for *Type 2,* History 313-4 or 341, 342; for *Type 3 (A),* History 313-4; for *Type 3 (B), History* 341, 342. (2) *Recommended* for all types: *Humanities:* Literature, all advanced courses given in a foreign language and all foreign literature courses in translation, including certain English courses; approved courses in classics, philosophy, religion, and speech. *Social Sciences:* Approved courses in government, history, psychology, and sociology. *Fine Arts:* Approved courses in architecture, art and music. *Science:* Approved courses in mathematics.

FRENCH. *Departmental Unit:* Usually French 201, 202, 241, 301, 302, 321, 322, 341, 342, 361, 362, and two semesters of courses numbered above 400. *Related courses:* A minimum of 16 credit hours from Architecture 221-2, 321-2, Art 341-2, 441-2, classics, English, German, government, Greek, history, Italian, Latin, Music 311-2, philosophy, Religion 111, 112, 345, Russian, Spanish, Speech 128, 318. A reading knowledge of at least one other foreign language is advised.

GEOGRAPHY. *Departmental Unit:* Required are Geography 11-12, 261, one additional regional course, 332, 441, and 6 additional credit hours.

Related courses: 16 credit hour minimum from Aeronautics 251, Business 301, Economics 11-12, Geology 11-12 or 101-2, Government 11-12, 241, 242, History 21-22, Sociology 11-12, 21-22, 257, 321, and others to meet special needs.

GERMAN. *Departmental Unit:* A minimum of 24 credit hours, exclusive of German 101, 102, including 201, 202, 241, 242, 301, 302, 321, 322, and two courses numbered above 400.

Related courses: A minimum of 16 credit hours chosen from art, classics, English, history, music, philosophy, speech, and any foreign language courses in translation. A reading knowledge of at least one other foreign language is recommended.

GOVERNMENT. *Departmental Unit:* A minimum of 24 credit hours, including Government 11-12. It is recommended that majors in goverment take a course in international politics and political theory. With the approval of the chairman of the department, Economics 342, 431, 432, and 472 may be counted as hours in government. The Department of Government offers courses and programs of study in American government and politics, international affairs and diplomacy, comparative government and regional studies, political theory, public administration and service, and pre-law studies.

Related courses: 16 credit hour minimum from economics, geography, history, philosophy, psychology and sociology. To meet special needs related courses may be taken in other fields, such as accountancy, business, religion and speech.

HISTORY. *Departmental Unit:* History 11-12 or 203-4, and enough advanced courses to total 24 credit hours. *Related courses:* 18 credit hours, departments and courses to be decided by the student in consultation with chairman of the department. Closely related departments are Classics, Economics, English, Geography, Government, Philosophy, Religion and Sociology.

PHILOSOPHY. *Departmental Unit:* A minimum of 24 credit hours, including 301, 302. An integrated program in ethics or philosophy of science.

Related courses: A minimum of 16 credit hours to fulfill a plan of integrated study.

RELIGION. *Departmental Unit:* A minimum of 24 hours including Religion 11-12. *Related courses:* 18 credit hours in philosophy, psychology, and sociology, or selected from Art 241, 242, 341-2, Classics 311, 312, English 305, 306, 335, 336, 441, 442, 451, 452, 475, Government 401, 402, History 21-22, 305, 422, 431, 432.

SOCIOLOGY. *Departmental Unit:* A minimum of 27 credit hours with Sociology 11-12 or 21-22 required and remaining hours to suit the student's interests. *Related courses:* A minimum of 20 credit hours including Economics 11-12, Government 11-12 and Psychology, 11-12. Most students should take Psychology 211, 432, or 451. Prospective graduate students should take Business 301 or Psychology 232.

SPANISH. *Departmental Unit:* Spanish 201, 202, 221, 301, 302, 321, 322 and two courses numbered above 400. For students planning to teach Spanish, 361 is also required. *Related courses:* A minimum of 16 credit hours to suit the need of the student. A reading knowledge of at least one other foreign language is recommended.

SPEECH. *Departmental Unit:* A minimum of 24 credit hours. Because of varied fields of interest (broadcasting, drama, interpretation, public address, speech correction), courses are approved by the chairman of the department in terms of individual goals.

Related courses: A 16 credit hour minimum chosen from courses approved in terms of their applicability to the speech field concerned.

Requirements for Bachelor of Science degree (Miami)

The degree is awarded in specialized curricula planned for the student who wants and should have more hours in a single department than are allowed for the A.B. degree, or one who wants and should have certain courses not credited toward the A.B. degree or a total number of credit hours in those courses not consistent with that degree, or one for whom a combination of courses not normally allowed is more serviceable than that of a Field of Concentration. To be eligible for the Bachelor of Science degree, a student must have:

1. Fulfilled all the university requirements including 36 hours of the common curriculum, residence, etc.
2. Completed at least 120 credit hours of acceptable academic work with at least a 2.00 (C) cumulative average.
3. Completed at least 46 advanced credit hours of Miami courses applicable to the degree.
4. Completed at least 36 credit hours in one department; by permission of the chairman of the major department up to 12 credit hours of this requirement may be taken in a closely related field.
5. Passed the 202 course in foreign language.
6. Completed all the requirements in one of the approved programs of study.

No more than 60 credit hours in any one department may be credited toward graduation.

SUGGESTED FRESHMAN PROGRAM—B.S. DEGREE

English 11-12 (cc)	6
Social Science (cc)	6
Biological or Physical Science (cc)	6
Subjects specified in the various curricula	12 to 18
	30 to 36

NOTE: Courses which fulfill the Common Curriculum requirement are followed by (cc).

Other Programs of Study for Specialization Leading to a Baccalaureate Degree

JOURNALISM. A student interested in journalism may earn an A.B. degree with a field of concentration in English by following, in addition to those courses required of all students, a program such as:

First year: English 21-22 or 31-32, 182, Government 11-12, History 11-12, Speech 131, 132; *Second year:* Economics 11-12, English 41-42, 191, 192, 231, 232, History 313-4, Sociology 11-12 or 21-22; *Third year:* English 301 or 342, 345, 381, 382 or 395, 396, Government 211 or 312, History 331, 332; *Fourth year:* English 361, 362 or 375, 376, 335 or 336, 351, 415, 416, 451, 452, History 353, 465, 466.

LAW. Pre-law students are encouraged to take a very broad liberal arts program. The courses should be selected from such offerings as the following: Accountancy 201-2, Classics 221, Economics 11-12, 321, 342, 351, English 231, 232, Government 11-12, 241, 261, 312, 315, 316, 401, 417, 432, History 11-12, 21-22, 427, 428, 443, Philosophy 123, 124, Sociology 11-12, 301, 348, 352.

SOCIAL WORK. Schools of social work advise that the student who plans to take professional training concentrate in sociology, with additional work in psychology and other social sciences, and that he have as broad an education as possible. The program which follows meets the requirements of the Council of Social Work Education, Inc., of which Miami is a member: *First year:* Sociology 11-12, Physiology 21-22, Government or Economics 11-12, English 11-12, modern foreign language; *Second year:* Humanities, Psychology 11-12, Sociology 343 or 257, a modern foreign language, a physical science, Speech 135, 136, or Psychology 232; *Third year:* Psychology 211, 212, 321, Sociology 301, 312, 341, 342, 345; *Fourth year:* Psychology 382, 422, 432, 451, 452, Sociology 344, 348, 352, 361, 432.

Sociology courses listed in the third and fourth years may be taken in reverse order. In general, Spanish is the most useful language for social workers.

Requirements for the Bachelor of Science in Education degree (Miami)

To be graduated with the B.S. in Education with a major in elementary education, the requirement is 122 credit hours, 36 of them in the common curriculum, fulfillment of the residence requirements and a cumulative grade point average of 2.00 (C).

The requirement for the student majoring in secondary education or in one of the practical arts fields is 36 credit hours in the common curriculum, a cumulative grade point average of 2.00 and a minimum of 2.25 in the teaching field. The minimum requirement is determined by the department concerned.

NOTE: The Ohio State Department of Education requires for certification the following:

For the Elementary Certificate: A minimum of 28 semester hours of professional education courses but not more than 35 semester hours. A minimum of 89 semester hours of general education (content) courses.

For the Secondary Certificate: A minimum of 17 semester hours of professional education courses but not more than 24 semester hours. A minimum of 100 semester hours of general education (content) courses.

The following courses listed under Education are considered general education (content) courses: Education 201 and Education 181 and 182.

The Miami University School of Education is accredited by the National Council for the Accreditation of Teacher Education.

TWO YEAR ELEMENTARY CURRICULUM (Students may not enter this program after 1966. The cadet certificate will not be issued after 1968.)

Freshman Year

Education 201-2 (cc)	6
English 11-12 (cc)	6
Geography 11-12 (cc)	6
Education 181, 182 (cc)	6
*History 11-12 or Government 11-12 (cc)	6
Mathematics 171	3
	33

Junior Year

History 21-22(cc)	6
Physiology 11-12 (cc)	6
Music 328	3
Education 440	3
Speech 125	2
Speech 126	3
Education 417	3
Elective	3
	29

Sophomore Year

Art Education 162	3
Education 215	3
Education 318	3
English 162	3
Music 165	3
Physical Education 281	2
Education 419	10
Education 422	2
Education 216	3
	32

Senior Year

Art Education 462	3
A literature course	3
Education 433	3
*Social Studies 361 or 362	3
Physiology 381	3
Electives	14
	29

* If History 11-12 is taken, Social Studies 362 should be taken. If Government 11-12 is taken, Social Studies 361 should be taken in the senior year.

FOUR YEAR ELEMENTARY CURRICULUM

Freshman Year

English 11-12 (cc)	6
Education 181, 182 (cc)	6
Education 201-2 (cc)	6
Mathematics 171	3
Music 165	3
Art Education 162	3
English 162	3
	30

Sophomore Year

Physiology 11-12 (cc)	6
History 21-22 (cc)	6
Geography 11-12 (cc)	6
Education 215	3
Education 216	3
Education 318	3
Speech 125	2
Physical Education 281	2
	31

FOUR YEAR ELEMENTARY CURRICULUM *(Cont.)*

Junior Year

Art Education 462	3
Music 328	3
Social Studies 361	3
Physiology 381	3
Speech 126	3
Social Studies 362	3
Education 417	3
Electives	11
	32

Senior Year

Education 422	2
Education 419	10
Education 433	3
A literature course	3
Social science elective	3
Education 440	3
Electives	6
	30

FOUR-YEAR ELEMENTARY AND SLOW LEARNER EDUCATION CURRICULUM

Freshman Year

Education 201-2 (cc)	6
English 11-12 (cc)	6
Education 181, 182 (cc)	6
Mathematics 171	3
Music 165	3
Art Education 162	3
English 162	3
	30

Sophomore Year

Physiology 11-12 (cc)	6
History 21-22 (cc)	6
Geography 11-12 (cc)	6
Physiology 381	3
Education 216	3
Education 318	3
Music 328	3
Physical Education 281	2
Electives	2
	34

Junior Year

Art Education 462	3
Social Studies 361	3
Psychology 452	3
Education 457	3
Speech 125	2
Speech 126	3
Education 473	3
Education 474	3
Electives	8
	31

Senior Year

Education 422	2
Education 433	3
Education 419	10
A literature course	3
Education 440	3
Education 476	3
Social Studies 362	3
Social science elective	3
Electives	2
	32

SECONDARY EDUCATION CURRICULUM PATTERN

Freshman Year

English 11-12 (cc)	6
Education 201-2 (cc)	6
Biological Science (cc)	6
Electives (major or supporting field)	12
	30

Sophomore Year

Humanities course (cc)	6
Physical Science (cc)	6
Social Science (cc)	6
Speech 131-2	4
Electives (major)	10
	32

Junior Year

Education (Curriculum and Methods)	2-5
Electives (major)	19
Electives (supporting field)	9
	30-33

Senior Year

Education 422	2
Education 429	10
Education 464	3
Education 440	3
Electives (major)	6
Electives (Supporting Field)	6
	30

NOTE: Students should consult the Miami University School of Education *Announcement* for major requirements.

ART EDUCATION CURRICULUM

Freshman Year

English 11-12 (cc)	6
Physiology 11-12 (cc)	6
Fine Arts 11-12 (cc)	6
Art 151-2	6
Art Education 111-2	6
	30

Sophomore Year

Education 201-2 (cc)	6
A physical science (cc)	6
A social science (cc)	6
Art 221-2	6
Art 261	2
Art 333	2
Speech 135	3
Art Education 271	3
	34

Junior Year

Education 429	10
Education 422	2
Education 464	3
Art Education 319	3
Art Education 351	2
Art Education 462	3
Art Education electives	7
	30

Senior Year

Education 440	3
Art Education 353	3
Art Education 411	3
Art Education 463	3
Art Education electives	7
Electives	11
	30

NOTE: Courses which fulfill the Common Curriculum requirement are followed by (cc).

Requirements for the Bachelor of Science in Business degree (Miami)

Each candidate for the degree Bachelor of Science in Business must (1) earn a minimum of 124 semester hours, 36 of them in the Common Curriculum, (2) achieve a minimum cumulative grade average of 2.00 on all work undertaken at the Oxford or the Dayton campuses, and (3) fulfill the specific and general course requirements of one of the several curricula in addition to the University residence.

These curricula are: Accounting, Business-Economics, Finance and Banking, General Business, Industrial Management, and Marketing and Merchandising.

The Miami University School of Business Administration is a member of the American Association of Collegiate Schools of Business.

Curriculum—B.S. in Business Degree

Freshman Year:

Business 101-102	4
English 11-12 (cc)	6
Mathematics 161-2 or 106, 107 and 112	6-10
Social Science (cc)	6
Physiology 11-12 (cc)	6
	28-32

Sophomore Year:

Accountancy 201-202	6
Economics 11-12 (cc)	6
Humanities course (cc)	6
Physical Science (cc)	6
Non-professional elective	4-8
	28-32

Basic Courses required in the Junior and Senior Years for all Majors:

Business 301	3
Economics 301	3
Finance 301	3
Management 301	3
Marketing 301	3
Business 401-2	6
Business 482	3
	24

Other requirements of the major fields to be taken in the Junior and Senior Years:

Accountancy Major:

Accountancy 312	3
Accountancy 332	3
Finance 302	3
English 331	2
Accountancy 401	3
Accountancy 402	3
Professional electives	8-12
Non-professional elective	8-12
	40

Business—Economics Major:

Business 472	3
Economics 415, 417	6
Economics 421-422	4-6
Professional and non-professional Elective	25-27
	40

CURRICULUM—B.S. IN BUSINESS DEGREE *(Cont.)*

Finance and Banking Major:

English 331 2
Economics 302 3
Finance 302 3
Accountancy 312 3
Finance 351 or 408 3
Economics 431 3
Finance 401 3
Professional (8-12) and non-professional (8-12) Electives... 20
40

General Business Major:

English 331 2
Economics 431 3
Economics (advanced) 3
Professional (13-19) and non-Professional (13-19) Electives.. 32
40

Management:

English 331 2
Management 302 3
Accountancy 311 or Industrial Education 356 3
Management 401 3
Management 402 or 451 3
Management 421 or 422 3
Professional (10-14) and non-Professional (10-14) Electives.. 24
40

Marketing Management:

English 331 2
Business 302 3
Marketing 302 3
Marketing 492 3
Marketing 421 or 441 or 451 or 461 or 471 (2 courses) 6
Professional (9-14) and non-Professional (9-14) Electives... 23
40

NOTE: Courses which fulfill the common curriculum requirement are followed by (cc).

Requirements for the Bachelor of Fine Arts degree (Miami)

The Dayton Campus offers work toward the Bachelor of Fine Arts Degree in cooperation with the School of the Dayton Art Institute. According to this plan studio courses are taken at the Art Institute. All other courses required for the degree are taken on the Dayton Campus. Students interested in this program will be assigned to a special adviser at the time of registration.

Candidates for degrees in the fields of the Fine Arts must comply with all university regulations, and must complete one of the curricula as outlined. However, a degree is recommended not simply for compliance with regulations. Rather, the faculty of the Miami University School of Fine Arts bases its recommendations for degrees on consideration of qualities of mind, character, ability, growth, and professional promise, as well as completion of the required number of hours and subjects in a given course.

The graduation requirement in credit hours in Art is 126. Included is the Common Curriculum requirement.

Curriculum—Bachelor of Fine Arts Degree

Freshman Year:

Art 111-2	6
Art 151-2	6
English 11-12 (cc)	6
Physiology 11-12 (cc)	6
Social Science (cc)	6
	30

Sophomore Year:

Art 221-2 and 211-2 or 201-2 and 231-2	10
Art 241-2	4
Art 251-2	4
Physical Science (cc)	6
Humanities course (cc)	6
	30

Design Major:

Junior Year:

Art 301-2	6
Art 331-2	4
Art 341-2	4
Art 351-2	4
Social Science (cc)	6
Electives	10
	34

Senior Year:

Art 401-2	6
Art 441-2	4
Art 451-2	4
Electives	18
	32

Graphic Arts Major:

Junior Year:

Art 311-2	6
Art 321-2	6
Art 341-2	4
Art 351-2	4
Social Science (cc)	6
Electives	8
	34

Senior Year:

Art 411-2	6
Art 441-2	4
Art 451-2	4
Electives	18
	32

Painting Major:

Junior Year:

Art 321-2	6
Art 341-2	4
Art 351-2	4
Social Science (cc)	6
Electives	14
	34

Senior Year:

Art 421-2	6
Art 441-2	4
Art 451-2	4
Electives	18
	32

Note: Courses which fulfill the common curriculum requirement are followed by (cc).

A student must have, both for advancement to junior standing and also for a recommendation for the degree Bachelor of Fine Arts, a credit point average of not less than 2.20 in his art subjects, and in the last semester of his senior year he must present an exhibition of his work in the annual senior show.

Requirements for the Bachelor of Science Degree (Ohio State)

The requirements for the Bachelor of Science at The Ohio State University may be summarized as follows:

1. The completion of the Common Curriculum as outlined above with the following modifications and additions:
   a. A mathematics requirement of 6 credit hours.
   b. An additional 4 credit hours of science not satisfied in the Common Curriculum.
   c. An additional humanities sequence which may not be literature.
   d. History 21-22 is required and may be included as one of the social science sequences.
   e. Psychology may not be taken to fulfill the social science requirement.
   f. Achievement of proficiency in a foreign language as evidenced by the successful completion of a second level college course or its equivalent.
2. A minimum College requirement of 131 credit hours. A student may find it necessary to earn more than 131 hours to complete the requirements of the curriculum under which he seeks to graduate.
3. A cumulative point-hour ratio of 2.0 in all work attempted at the Dayton Campus.
4. The residence requirement of two full-time trimesters (30 credit hours) completed at the Dayton Campus.
5. Every candidate for the degree shall file with the College an application. This application shall be filed one trimester prior to the granting of the degree.
6. A maximum of 50 credit hours earned in a single department may be accredited to the fulfillment of the degree requirements.
7. The minimum requirement in a field of concentration (Major) is 27 hours of credit as prescribed by the student's faculty adviser.

In conclusion, each student's academic program must be developed with his adviser because many of the requirements stated above are minimal and additional requirements may be imposed, depending upon the special academic background of the student as well as his major.

BIOLOGY

Majors in Biology will take an integrated comprehensive major rather than specialization in botany, zoology, etc. Entering majors are expected to take the following: *Freshman*—Chemistry 101-2, English 11-12, Mathematics 106-107 or 112, Physiology 11-12. *Sophomore*—Chemistry 251-2, Physiology (Biology) 201-2, a foreign language (German, French, or Russian) *or* additional mathematics,

and a social science for the common curriculum. During the Junior and Senior years there will be courses in molecular biology and comparative physiology to complete the core of the biology course program. Additional advanced biology courses will be selected on consultation with the curriculum advisor. Related courses include physical chemistry, physics, and the completion of the equivalent of two years of a foreign language. Common curriculum requirements generally will not be met until the Junior-Senior years. An honors credit of 3-5 hours will be offered to outstanding seniors for the completion of a research problem and thesis.

CHEMISTRY

The recommended program includes the following: *Freshman*-Chemistry 101-2, English 11-12, Mathematics 106-107 and 112, and a social science 11-12 sequence. *Sophomore*-Chemistry 251-2, Physics 151-2, Mathematics 201 and 202-301, and Physiology 11-12 or other common curriculum course. The Junior and Senior years will include physical chemistry, instrumental analysis, and advanced inorganic chemistry. Supporting courses would include two years of German, (for an A.C.S. approved degree), additional common curriculum courses, and elective courses. Students with adequate preparation may be able to start with Mathematics 112 or a second year foreign language.

ENGINEERING

The first two years or Pre-Engineering curriculum is common to almost all branches of engineering. The following courses would be taken by qualified students as indicated: *Freshman*—Chemistry 11-12, English 11-12, Industrial Technology 151-2, Mathematics 112 and 201, and a common curriculum course. *Sophomore* —Mathematics 202-301, Physics 151-2, Physics 224 (Statics), and one or two common curriculum courses. Sophomores should also plan to take a second course in mathematics and those planning to major in Chemical Engineering should take Chemistry 251-2. This program satisfies most engineering schools' Pre-Engineering requirements. The second phase of the engineering program will include advanced undergraduate courses in several fields and will lead to the Bachelor's degree in Engineering.

GEOLOGY

Most majors with adequate background should take the following: *Freshmen*-Chemistry 101-102, English 11-12, Geology 11-12, and a social science. *Sophomores*-Geology 201 and 231, 301-2, Mathematics 112-201, Physiology 11-12, a foreign language, and a common curriculum course. *Juniors* and *Seniors* will take department courses in structure, stratigraphy, regional, and mineral deposits plus optional courses depending on specialization. Supporting courses include 2nd year foreign language, Physics 151-152 and other courses depending on field of interest. A summer field course between the Junior and Senior year is required.

MATHEMATICS

The mathematics major with proper secondary school background should take the following: *Freshman*-Chemistry or Geology 11-12, English 11-12, Mathematics 112 and 201, and a social science from the common curriculum. (Two hours of computer science will be required when facilities are available). *Sophomore*-Mathematics 202-301 and 209-211, Physics 151-2, Physiology 11-12, and a social science. During the Junior and Senior years the major will take 21 additional hours of mathematics, two years (or equivalent) of a foreign language, a humanities course, and sufficient electives to meet degree hour requirements.

PHYSICS

Most majors should take courses which will prepare them for graduate school. The recommended program includes the following: *Freshman*-Chemistry 101-2, Mathematics 112 and 201, German 101-2, and English 11-12. *Sophomores*-Physics 151-2, Mathematics 202-301 plus an additional course in mathematics, German 201-2, and a common curriculum course. The Junior and Senior years will include courses in classical mechanics, electricity and magnetism, quantum mechanics, modern (atomic and nuclear) physics, thermodynamics, and advanced laboratory plus courses to complete the common curriculum. All Physics courses beyond 151-2 have a prerequisite of Mathematics 202-301.

PSYCHOLOGY

Majors will normally follow the following schedule: *Freshmen*-English 11-12, Psychology 11-12, Physiology 11-12, common curriculum courses in the humanities and in the social sciences. *Sophomores*-Psychology 232 and 391, Mathematics 106-107 or 161-2 *or* an elective in psychology, a foreign language, a physical science, and completion of common curriculum requirements in the social sciences. During the Junior and Senior years there will be required courses in experimental psychology, with elective course offerings in engineering, industrial, and clinical psychology. An additional 6 hours of physical or biological science is required and the second year of a foreign language. Electives and supporting course study should be chosen on the basis of the particular field of interest with the advice of the staff.

GENERAL RULES AND REGULATIONS

Grade Explanation

Achievement of a student is indicated by the following grades: A, B, C, D, E (condition), F (failure), I (incomplete), W (withdrawn).

In computing grade averages one credit hour of A equals 4 points, B equals 3 points, C equals 2 points, D equals 1 point, and E, F, and I give no points.

An E can be removed by examination at stated times.

An I for work not completed must be removed within the first six weeks of the next trimester. If not removed, it automatically becomes an F.

Grade reports are mailed as soon after the end of the trimester as possible.

Scholastic Regulations

a. Scholastic actions (probation, suspension, dismissal) are taken by the Registrar on the basis of trimester grade averages as computed in the Office of the Registrar.

b. A student carrying 9 or more credit hours in any trimester or term is subject to the same scholastic regulations as if he were carrying a full load.

c. A part-time student carrying less than 9 credit hours, either on or off campus, is subject to scholastic action at the close of the trimester in which the total credit hours completed or attempted reaches or exceeds 12, and at the completion of each trimester thereafter in which a similar 12 credit hour increment is reached.

d. Minimum grade requirement

1. The minimum grade requirement for freshmen is an average of 1.7 on the work of each trimester.
2. The minimum grade requirement for all students who have earned or attempted 24 or more credit hours at Miami University or elsewhere is an average of 2.0 on the work of each trimester.

e. A student who fails to meet his minimum grade requirement at the close of any trimester shall be placed on probation.

f. At the close of a trimester of probation, one of the following actions shall be taken:

1. If the student's average for the trimester meets the minimum grade requirement, and his cumulative average is 2.0 or higher, he shall be removed from probation.
2. If his average for the trimester meets the minimum grade requirement, but his cumulative average is below 2.0, he shall be continued on probation.
3. If his average for the trimester is below the minimum grade requirement, he shall be suspended for low scholarship.

g. Any student whose grades for a trimester have an average lower than 1.0 shall be suspended regardless of whether or not he has previously been on probation.

h. A student readmitted after suspension for low scholarship re-enters on probation regardless of his cumulative average.

i. A second suspension for low scholarship constitutes dismissal from the university.

Readmission to the University

a. A student suspended for scholarship may, after at least one calendar year has elapsed, be readmitted upon application to the Committee on Admission. The petition for re-admission must be accompanied by evidence of the student's likelihood of maintaining the required scholastic average in the future. If the Committee on Admission approves the student's re-admission, he will return on probation and under whatever special requirements the Committee finds justified in his case.

b. A student who has been dismissed may under unusual circumstances show cause for a third chance. In such a case, he presents a petition to the Committee on Admission, which will not ordinarily consider such a petition until two calendar years have elapsed.

Withdrawals and Changes of Registration

Course may be added, dropped, or changed only with the approval of the student's adviser. Cards for reporting such changes may be obtained from the adviser, and no change is official until the change-of-course card, properly signed, is deposited in the Office of the Registrar. A $5.00 fee is imposed for a change of course. No student may be admitted to or receive credit for a course in which he is not properly registered. A student may enter a course no later than the fourth meeting or the close of the second week, whichever is earlier.

When withdrawal from a course occurs within three weeks of the date when classes begin (for all students who have earned or attempted 24 hours of credit, at the Dayton Campus or elsewhere), or within seven weeks from that date (for freshmen), no grade shall appear on the student's record. After these dates, any student who drops a course shall receive an F in the course, unless permitted to drop without grade by the Committee of Advisers with the concurrence of the Inter-Divisional Committee of Advisers.

The last day for withdrawal from classes in either term of the third trimester is Friday of the second week of instruction.

A student withdrawing from the University must file in the Office of the Registrar a withdrawal form approved by his adviser.

A student who stops attending a course and does not make an official withdrawal will receive a grade of F.

Class Attendance

Every student is expected to attend every class for which he is registered. A student who does not attend regularly is subject to discipline unless he has reasons acceptable for absence.

Whenever a student is specifically reported in writing by an instructor to the Recorder as being absent from class to such an extent as to make his work inefficient

or to impair the morale of the class, the Recorder will drop the student from the course with a grade of F.

English Requirement

English 11-12 or its accepted equivalent is to be completed in the freshman year unless the student is required to repeat either semester. No student will be admitted to the fifth trimester of college work until he has credit for both trimesters of English 11-12. Transfer credit in Freshman English will be accepted only if it has been earned as part of a full load in a regular term or if the student passes a proficiency examination given by the Department of English.

GRADUATE STUDY

Courses carrying graduate credit are scheduled by both Miami University and The Ohio State University. These courses have been scheduled for late afternoons, evenings, and Saturday mornings.

To register for graduate credit a student must be admitted to graduate standing by the Graduate School of one of the parent universities.

For detailed information regarding admission, regulations, degree programs, and graduation requirements, the student is referred to the announcements of the Miami University Graduate School and The Ohio State University Graduate School. These announcements are available at the Dayton Campus and at the parent campus of each institution.

Graduate Study at Miami University

A student accepted for admission to the Graduate School may register for graduate credit in any of the courses marked with an asterisk in the course listings, provided he has the prerequisites for the course. If he is pursuing an advanced degree at Miami University, a minimum of one half of the credit hours required for any degree must be earned on the Oxford Campus and/or the Dayton Campus. The application of credits earned in Dayton to the fulfillment of this requirement is limited to those earned on the Dayton Campus after September 1964. For all graduate programs in Education, students who first enroll in a degree or certificate program in September, 1964 or later are required to earn at least 9 hours of credit on the Oxford campus within a given semester or summer session.

Graduate Study at The Ohio State University

Upon admission to the Graduate School a student may register for credit in any of the graduate courses listed in this Bulletin, provided he has the proper prerequisites. An adviser is assigned to each student once admitted. The student should counsel with his adviser concerning all courses desired and his graduate

program in general. All requirements for the masters degree may be met on the Dayton Campus. A maximum of nine quarter hours credit may be transferred from another university if all the following conditions have been met:

1. The student is in good standing in the other university.
2. The grades in courses transferred are B or better.
3. The student registers for a minimum of three quarters in the Graduate School of The Ohio State University.
4. The credit for the graduate course work at another institution is properly transferred through the Admissions Board and approved by the Graduate Committee of the department concerned.

Graduates of The Ohio State University may, under conditions stated above, transfer one-half of the required work provided that they register for a minimum of two quarters in the Graduate School of The Ohio State University.

In all cases, a candidate for the Master's degree is subject to a final examination on all work offered for the degree. He must also be registered in the Graduate School during the quarter in which he expects to receive his degree.

COURSES OF INSTRUCTION
IN
THE GENERAL COLLEGE
AND
THE MIAMI ACADEMIC CENTER

Explanation of Course Listings

Courses designated by consecutive numbers separated by a hyphen (101-2) give credit only if both are successfully completed unless otherwise stated in the course description.

Those designated by consecutive numbers separated by a comma (141, 142) are related courses, each giving a semester's credit. The first is *not prerequisite* to the second unless so indicated in the course description.

Credit hours per semester are indicated in parenthesis after the title.

Common Curriculum courses are numbered with two digits.

Other elementary courses are numbered 100-199; sophomore-level courses are 200-299; junior and senior level are 300-499; those 500 and above are primarily for graduate students; those 600 and above are exclusively for graduate students.

A course giving graduate credit is marked with a star (*).

Courses which may be repeated for credit are designated by numbers ending in zero.

ACCOUNTANCY (ACC)

201-2 PRINCIPLES OF ACCOUNTING (3)
An elementary course in fundamental principles.

312 INTERMEDIATE ACCOUNTING (3)
Advanced problems in the valuation of balance sheet accounts and the determination of income. Preparation of financial statements. Prerequisite: Accountancy 201-2.

332 MANAGERIAL COST ACCOUNTING (3)
The generation and uses of accounting data for planning and controlling business operations and as an aid to special decisions. The major points of emphasis are cost-volume-profit analysis, budgets and standards, variance analysis, cost behavior, and costs relevant to special decisions. Prerequisite: Accountancy 201-2.

401* AUDITING (3)
Verification of financial statements by independent public accountants. Auditing techniques and procedures illustrated by a practice case. Prerequisites: Accountancy 311, 312.

402* INCOME TAX ACCOUNTING (3)
Internal Revenue Code, regulations, tax court rulings and federal court decisions. Preparation of income tax returns. Prerequisites: Accountancy 201-2 or 621, and 6 advanced credit hours Business Administration.

432* ADVANCED COST ACCOUNTING (3)
Job order and process cost accounting systems for the accumulation of cost data. Methods of accumulation, distribution, and control of material, labor, and overhead costs. Problems of inventory valuation for financial statement purposes. Prerequisites: Accountancy 332 and 3 advanced credit hours Business Administration.

452* ADVANCED ACCOUNTING (3)
Accounting theory and advanced problems in partnership, branch, insolvency, estate and trust accounting, and consolidated statements. Prerequisites: Accounting 312, 332.

621* GRADUATE SURVEY IN PRINCIPLES OF ACCOUNTING (4)

ART (ART)

111-2 VISUAL FUNDAMENTALS (3)
Elements and principles of art in the fields of design and painting; their application in a wide range of media.

151-2 DRAWING (3)
Elementary freehand drawing for art majors.

201-2 DESIGN (3)
Development of the theory and practice of design in various materials, Prerequisites: Art 111-2 and 151-2.

211-2 PAINTING (3)
The principles of pictorial design. Prerequisites: Art 111-2 and 151-2.

221 PAINTING (3)
Figure, portrait, and landscape painting; pictorial composition. Prerequisites: Art 111-2 or Art Education 111-2 and Art 151-2.

ART *(Cont.)*

231-2 LETTERING (2)
A study of calligraphy and the development of type forms. Adaptation of hand lettering to modern uses.

241, 242 HISTORY OF WESTERN ART (2)
(241) A study of architecture, sculpture, and painting from the earliest time to the end of the Greek period. (242) From the end of the Greek period to the close of the Gothic period.

251-2 DRAWING (2)
Drawing and sketching including a study of human anatomy. Prerequisites: Art 151-2.

261, 262 ELEMENTARY POTTERY (3)
(261) Simple glazes and glaze decorations. (262) Mold making; slip-casting and pressing. Decorative processes, including intaglio and relief.

333 MODELING (2)
Experimentation in methods and materials of ceramic sculpture.

361-2 ADVANCED POTTERY (2)
Development of the techniques of throwing, decorating, glazing, and firing. Prerequisite: 261-2 Lab.

365-6 ENAMELING (3)
A basic course in enameling on metal. Open only to juniors and seniors in the departments of art and art education.

ADVANCED PAINTING (2 or 3)
Prerequisities: Art 321-2 and 351-2. 1 Rec. 3 Lab. Graphic arts majors only may register for 2 credit hours.

425-6* METHODS IN CREATIVE PAINTING (3)
Studio course in painting and related media. Not open to art majors in School of Fine Arts. Prerequisites: undergraduates: Art 151-2, Art Education 171, or equivalent; graduates: 12 credit hours in art, art education, or equivalent, 6 of which must be advanced.

ART EDUCATION (AED)

111-2 THE INDIVIDUAL AND THE CREATIVE PROCESS (3)
(For Art Education majors) Basic course providing experiences for student's awareness of himself as an individual responding to his environment. Methods and disciplines of creating with materials and tools.

162 THE INDIVIDUAL AND THE CREATIVE PROCESS (3)
A basic course providing experiences for the elementary teacher's awareness of himself as an individual responding to his environment. Included are methods and disciplines of creating with materials and tools.

171 INTRODUCTION TO DESIGN (3)
Understanding design in various forms of art expression. Discussion and exploration with materials.

271 CRAFTS FOR TEACHERS (3)
Creative problems in paper, wood, clay, fibers and metal for the elementary grades.

351 ART APPRECIATION FOR CONTEMPORARY LIVING (2-3)
Understanding the influences and the interaction of the creative arts in our present culture. Emphasis on developing appreciation in the public school and its applications to teaching.

ART EDUCATION *(Cont.)*

353 School Exhibits and Displays (3)
Problems in poster design and display techniques to function with the educational program. Individual and group problems. 1 Rec. 2 Lab.

403 Weaving (3)
Use of loom and other hand techniques in weaving as a craft. Creative exploration of fibers in the completion of original ideas.

404* Textile Design (3)
Methods of applying surface design on fabrics; emphasis on silkscreen as it may be used in the public school program; analysis of fundamentals of textile design in contemporary living.

462 The Child and the Creative Process (3)
Developing an understanding of child growth and development through creative expression. Experiences in drawing and painting are emphasized. Prerequisite: Education 201-2.

463* The Adolescent and the Creative Process (3)
Fundamental course to help the prospective teacher to become aware of the creative growth and development of the adolescent. Laboratory experiences include problems of implementing a secondary art curriculum. Prerequisite: Art Education 462 and student teaching or its equivalent. 1 Rec. 2 Lab.

502* Graduate Study in Crafts (3)
Individual problems in several craft areas to meet the needs of teachers of art. Prerequisite: 12 credit hours of Art or Art Education.

BUSINESS (BUS)

101-2 Principles of Modern Business (2)
Introductory course.

301 Statistics (3)
Statistical theory and practice. Prerequisites: Economics 11-2, Mathematics 105 or 161.

302 Business Statistics (3)
Application of statistical methods to problems of production, marketing, finance, and business forecasting. Prerequisite: Business 301.

401-2 Business Law (3)
Contracts, agency, sales, negotiable instruments, property, torts, bailment, common carriers, partnership, corporations, and insurance. Prerequisites: Economics 11-2.

482* Government and Business (3)
Relations of business and government. Prerequisites: Accountancy 201-2, Economics 11-12 and 6 advanced credit hours Business Administration.

611* Graduate Survey in Business Law (3)

622* Methods of Business Research (3)
Prerequisites: Business 301 or 621.

631* Administrative Policy and Management (3)
Prerequisites: completion of pregraduate requirements and candidacy for the M.B.A. degree.

CHEMISTRY (CHM)

11-12 General Chemistry (3)
Introductory chemistry for non-science major. 2 lectures, 1 lab.

105 Qualitative Analysis (3) (O.S.U. 409)
To qualify students who have taken Chemistry 11-12 for the advanced courses in the chemistry sequence as science majors. Chemistry 11-12 with Chemistry 105 meets the required prerequisite for Chemistry 241. 1 lecture, 2 labs.

101-2 General Chemistry Including Qualitative Analysis (5)
Science majors and other students who plan to take advanced chemistry courses other than Chemistry 231-2 should elect Chemistry 101-2. Students who have not had high school chemistry must plan to spend additional time on the course and should arrange their schedule accordingly. 2 lectures, 2 labs.

ADVANCED COURSES

231-232 Organic Chemistry and Biochemistry (3)
(231) Fundamentals of organic chemistry. Prerequisite: Chemistry 12 or 102.
(232) The chemistry of carbohydrates, lipids, proteins, enzymes, hormones, vitamins, alkaloids and medicinals as applied to humans. Prerequisite: Chemistry 231.
2 lectures, 1 lab.

Note: Credit may not be received for both Chemistry 231, 232 and 241-2.

241-242 Organic Chemistry (4)
Compounds of carbon. A basic course in organic chemistry for science majors. Prerequisite: Chemistry 102 or 105. 2 lectures, 1 lab.

251-252 Organic Chemistry (5)
A fundamental course in chemistry designed for chemistry majors and chemical engineers. Prerequisite: Chemistry 102 or 105. 2 lectures, 2 labs.

CLASSICS (CLS)

THE CLASSICAL HUMANITIES

11-12 Classical Humanities (3)
Comprehensive survey of classical cultures based on selected readings from great writers of Greece and Rome. Lectures on relationship of writers to their society; on basic art contributions of the ancient world; on transmission of classical thought and action to western civilization.

221 Roman Law (2)
History and development of Roman constitutional and civil law; substance of Roman law with effect upon later codes and civilizations.

232 The Greek Philosophical Writers (2)
Greek philosophy and the personalities and backgrounds of the principal philosophers, with emphasis on Plato and the Republic. Readings, lectures, discussions.

311 Masterpieces of Greek Literature (3)
Earlier Greek literature, including Homer's *Iliad* and *Odyssey*, the lyric poets, and the histories of Herodotus and Thucydides.

312 The Greek Theatre (3)
Plays of Aeschylus, Sophocles, Euripides, and Aristophanes in a variety of translations; the origin and development of the drama and the theater. Comparisons with modern drama.

CLASSICS *(Cont.)*

LATIN LANGUAGE AND LITERATURE

101, 102 BEGINNER'S COURSE (4)
Rapid survey of the essentials of the Latin language, with selections from Caesar's *Gallic Wars.* Special attention to the relation of Latin to English and the Romance languages.

ADVANCED COURSES

Latin 101 and 102 or their equivalents or two years of high school Latin are the minimum prerequisites for all advanced courses in Latin.

201-2 RESPRESENTATIVE PROSE AUTHORS (3)
Review of essentials and reading for comprehension. Cicero's *De Amicitia* and *De Senectute,* or *Tusculan Disputations;* selections from Livy.

ECONOMICS (EC)

11-12 PRINCIPLES OF ECONOMICS (3)
Fundamental economic principles as an aid in understanding modern economic society.

ADVANCED COURSES

Prerequisite for advanced courses: Economics 11-12. For graduate credit, 11-12 or 621* and 6 credit hours in advanced courses business, economics and/or other social science.

301 MONEY AND BANKING (3)
Functions of money, credit, and banking in modern economic society.

302* MONETARY THEORY AND FISCAL POLICY (3)
Money and price levels. Federal Reserve policy and stabilization, control of the money market by the Federal Reserve and Treasury. Prerequisite: Economics 301.

415*, 417* INTERMEDIATE PRICE THEORY; INTERMEDIATE NATIONAL INCOME ANALYSIS (3)
Examination of the general principles and analytical tools of economic analysis.

431*, 432* TAXATION; FINANCING GOVERNMENT (3)
(431) Forms and principles of taxation. (432) Fiscal policies and principles of public finance.

611-612* GRADUATE SURVEY IN PRINCIPLES OF ECONOMICS FOR TEACHERS (3)
Basic economic principles for teachers with some background in the social sciences, but without previous instruction in economics.

EDUCATION

440 SENIOR SEMINAR IN EDUCATION (3)
Curriculum trends in the modern schools, developing a philosophy of education. Prerequisite: Education 419 or 429.

EDUCATION: EDUCATIONAL ADMINISTRATION (EDA)

422 EDUCATIONAL ORGANIZATION (2)
Understanding all levels of school organization; legal provisions concerning teachers; professional associations. Prerequisite: methods course; taken concurrently with student teaching; or, permission of instructor.

521* THE JUNIOR HIGH SCHOOL (3)
For teachers, administrators, and special service personnel in junior high schools. Overview of curriculum, organization, administration, and guidance programs appropriate to schools for this age group. Prerequisites: 12 credit hours in education and a provisional certificate or better.

581* SCHOOL BUILDINGS AND EQUIPMENT (3)
Building types; efficient use of buildings and equipment. Prerequisite: graduate standing in Educational Administration.

582* SCHOOL LAW (3)
Statutes and judicial decisions related to legal authority; responsibilities of boards of education, teachers and administrators. Prerequisite: graduate standing in Educational Administration.

593* SCHOOL FINANCE (3)
Guiding principles for developing adequate financial programs; detailed study of sources of revenue, local, state and federal; procedures in management of school funds with reference to budgeting, accounting and auditing. Prerequisite: graduate standing in Educational Administration.

596* ORGANIZATIONS AND ADMINISTRATION OF PUBLIC SCHOOLS (3)
Principles of democratic school administration; management of teaching and non-teaching personnel; role of administration in facilitating teaching and learning; school-community relations. Prerequisite: graduate standing in Educational Administration.

597* PROBLEMS OF THE SCHOOL PRINCIPAL (2-4)
Duties, problems and roles of elementary and secondary school principals; relations with central administration, staff, students and community. Prerequisite: graduate standing in Educational Administration.

EDUCATION: EDUCATIONAL FOUNDATIONS (EDF)

201-2 INTRODUCTORY EDUCATIONAL PSYCHOLOGY (3)
Psychological principles with emphasis on their application to teaching. Prerequisite for 202: Education 201 or Psychology 11-12 or Psychology 151.

401* PHILOSOPHY OF EDUCATION (3)
Function of education in American society; educational objectives and how they are determined. Prerequisite: senior or graduate standing in education or permission of the instructor.

433* CHILD DEVELOPMENT (3)
Factors which influence growth and development. Prerequisite: Education 202.

501* ADVANCED EDUCATIONAL PSYCHOLOGY (3)
Recent scientific investigations in psychology with application to education of children and youth. Prerequisite: 12 credit hours of education including 6 credit hours of general and educational psychology.

525* SOCIAL FOUNDATIONS OF EDUCATION (3)
Relation between public education in a democracy and the basic social trends of industrial civilization.

EDUCATION: EDUCATIONAL FOUNDATIONS *(Cont.)*

551* EDUCATION RESEARCH (3)
Critical study of research techniques and reporting methods.

EDUCATION: GUIDANCE AND SPECIAL EDUCATION (EDG)

457* EDUCATION OF SLOW LEARNERS (3)
Psychology of mentally retarded children; methods and materials appropriate for teaching them. Prerequisites: Education 201-2 and special methods.

461* PRINCIPLES OF GUIDANCE (3)
Needs and necessary provisions; methods of investigation for various types of guidance; general organization and evaluation of outcome. Prerequisite: senior or graduate standing in Education.

462* PUPIL'S PERSONALITY PROBLEMS (3)
Causes and treatment of common personality and behavior problems of children and youth. Prerequisite: senior or graduate standing in education including Education 433 or its equivalent or permission of the instructor.

464* EVALUATION (3)
Evaluation of learning; measurement and reporting. Prerequisite: methods course or permission of instructor.

473* CURRICULUM DEVELOPMENT FOR SLOW LEARNERS (3)
Practices and procedures used in developing school programs; techniques and methods used in the development of a modern life-problem centered curriculum, utilizing social studies and arithmetic in the implementation of the curriculum. Prerequisite: Education 457.

474* SKILL SUBJECTS FOR SLOW LEARNERS (3)
Place of language arts in the curriculum; teaching problems, processes, methods and techniques used to teach skill subjects at various levels of the special class program. Prerequisite: Education 457.

475* INSTRUCTIONAL MATERIALS FOR SLOW LEARNERS (3)
Techniques in the preparation, selection and adaptation of instructional materials for slow learners; sources of materials, application and demonstration at various levels of the special class program. Prerequisite: Education 457.

476* OCCUPATIONAL TRAINING FOR SLOW LEARNERS (3)
Role of occupational training in the curriculum; relationships with the world of work; problems of organizing and administering; methods and techniques used in developing occupational interests at various levels. Prerequisite: Education 457.

523* FAMILY FINANCIAL SECURITY (3)
Financial problems of the family: credit and borrowing, life and other forms of insurance, real estate ownership, savings and investment problems. Means of incorporating family financial security education in the secondary school curriculum. Prerequisite: senior or graduate standing.

559* GUIDANCE SERVICES IN THE ELEMENTARY SCHOOL (3)
The role and services of the guidance function; materials, methods and personnel involved in the counseling process. Prerequisites: graduate standing in education.

561* TECHNIQUES OF COUNSELING (3)
Development of skills and understandings in personal interviewing for professional counselors. Prerequisite: Education 461 and 563.

EDUCATION: GUIDANCE AND SPECIAL EDUCATION *(Cont.)*

563* Diagnostic Techniques in Guidance (3)
Readiness, grade placement; placement in special education, curriculum selection; appropriate study as indicated by measures, reports, and records. Prerequisite: Education 461.

565* Organization and Administration of Guidance Services (3)
Problems involved in organizing and administering guidance services in a school. Prerequisite: Education 461.

567* Educational Statistics (3)
Through linear correlation including computations for the evaluation of common measures and interpretation of test results. Prerequisites: graduate standing including 12 credit hours of professional education.

568* Advanced Educational Statistics (3)
Partial, multiple correlation; the regression equation; computations for research. Prerequisite: Education 567.

EDUCATION: INSTRUCTION (EDI)

181, 182 Physical Science (3)
Content of the physical sciences integrated to promote understanding of and intelligent interaction with physical aspects of environment. Prerequisite for 182: 181 or permission of instructor.

215 Language Arts in the Elementary School (3)
The basic course in the teaching of language arts including listening, speaking, written expression, handwriting, spelling, and grammar and usage. The course is required of all students preparing to teach in the elementary school. Prerequisite: Education 202.

216 Reading in the Elementary School (3)
Basic course, including the nature of reading, methods, materials, appraisal, diagnosis and correction of reading difficulties. Required of all students preparing to teach in the elementary school. Prerequisite: Education 202.

318 Arithmetic in the elementary School (3)
Materials and methods for meaningful teaching. Prerequisites: Education 202, Mathematics 171.

332 English in the Secondary School (2-3)
Methods and materials for teaching language arts; current trends in the curriculum for high school English; development of a teaching unit. Prerequisites: Education 202, 6 credit hours of English and junior standing.

338 Mathematics in Secondary Schools (3)
A study of curriculum, methods, and materials in the mathematics of grades 7-12. Prerequisites: Education 202 and Mathematics 211 (or concurrent registration in the latter).

339* Biological Science in the Secondary School (2)
Fundamental biological principles and presentation; emphasis on laboratory techniques for student and teacher demonstration. Prerequisites: 8 credit hours of zoology, 8 credit hours of botany, or the equivalent, Education 202.

411* Elementary School Curriculum (3)
Construction, theories and techniques; curriculum research. Prerequisite: 12 credit hours in education.

EDUCATION: INSTRUCTION *(Cont.)*

415* Teaching in the Kindergarten (3)
Materials and methods. Prerequisite: Education 202.

417* Teaching Social Studies in the Elementary School (3)
Objectives, basic principles, suggested activities, and methods of procedure. Prerequisite: Education 202, 6 hours of social sciences.

431* Physics and Chemistry in the Secondary School (2)
Discussion and demonstration of methods of introducing them to high school pupils. Prerequisite: at least a minor in the field, Education 202, 12 credit hours of physical science.

434*, 435*, 436*, 437*, 438* Business Education Methods (1 for each)
(434)-Typing; (435)-Shorthand; (436)-Social Business; (437)-Accountancy; (438)-Marketing. Students register for two or more according to major or minor fields. Prerequisites: at least a minor in the field, Education 202.

439* Social Studies in Secondary School (3)
Objectives in civic education; materials and methods of procedure to promote civic efficiency. Prerequisites: at least a minor in the field, Education 202, 6 credit hours of social studies.

449* Audio-visual Materials and Methods (2-3)
Role of visual and auditory instruction; the psychology of and educational principles pertinent to such instruction. Prerequisite: methods course or courses.

459* Advanced Reading Instruction (3)
Intensive study of selected problems in the improvement of reading. For teachers, administrators, and supervisors. Not open to students who have had Education 459 W. Prerequisite: Education 316.

511* Seminar in Elementary Education (3-6)
Individual and group study of problems in the field of elementary education. Prerequisite: 12 credit hours in education.

512* The High School Curriculum (3)
Curricular organization of the secondary school; social and psychological foundations; course of study improvements. Prerequisite: 12 credit hours in education.

513* Supervision of Teaching (3)
Principles, methods and techniques of leadership in improving the educational programs of elementary and secondary schools. Prerequisite: 12 credit hours in education.

515* Curriculum Development in the Public School (3)
General principles and practices of curriculum development; consideration of philosophy of curriculum change; aims of education; recommended curriculum reorganizations. Prerequisite: 12 credit hours in education.

532* Diagnostic and Remedial Teaching (3)
Clinical and classroom aspects of learning retardations with emphasis on procedures, materials and techniques. Prerequisites: graduate standing including Education 445 or teaching experience; 12 credit hours in education.

ENGLISH (ENG)

11-12 COMPOSITION AND LITERATURE (3)
Study and practice of effective writing. Introduction to the critical study of literature: drama, fiction, poetry, the essay.

31-32 LIFE AND THOUGHT IN ENGLISH LITERATURE (3)
Selected works of Chaucer, Shakespeare, Milton, Swift, Keats, Dickens, Shaw, and others.

41-42 LIFE AND THOUGHT IN AMERICAN LITERATURE (3)
(41) Chief American writers from the colonial period to the Civil War. (42) Chief American writers from the Civil War to the present.

NOTE: In English 31-32 and 41-42, either semester may be taken first. Credit is granted for either semester separately, when not used to meet the Common Curriculum requirement.

162 CHILDREN'S LITERATURE (3)
Provides wide acquaintance with children's books; emphasis on their use in all subject areas.

ADVANCED COURSES

English 11-12 or 15-16 is the minimum prerequisite for all advanced English courses. English 301, 302, 305, 306, 325-6, 351, 352, 355, 356 are open to sophomores, juniors and seniors. All other 300 courses are open to juniors and seniors. All 400 courses in literature, except English 481-2, Independent Reading, are open to juniors, seniors and graduate students who have had nine credit hours of literature (English 12 or 16 may be counted among the nine). All 500 courses are open to graduate students who have had nine credit hours of Literature and to qualified seniors by permission; all 600 courses are open only to graduate students.

231, 232 ADVANCED COMPOSITION (2)
(231) Practice in various types of expository writing. (232) Practice in various types of descriptive and narrative writing.

301, 302 SHAKESPEARE: THE PRINCIPAL PLAYS (3)
(301) Intensive or casual study of some sixteen of the plays, chiefly the earlier ones. (302) Intensive or casual study of some sixteen of the later plays.

321, 322 MAJOR AMERICAN WRITERS (3)
(321) Selected writers from the Revolution to the Civil War; special attention to Emerson, Hawthorne, and Melville. (322) Selected writers from the Civil War to the present; special attention to Whitman, Mark Twain, and Henry James. Not open to those who have credit for English 41-42.

325-6 SHORT STORY WRITING (2)
Techniques and principles of narrative writing with special application to the short story.

351 MODERN AMERICAN ENGLISH: THE HISTORICAL AND LINGUISTIC BACKGROUND (3)
Nature and growth of the language in terms of contemporary linguistic science.

352 MODERN AMERICAN ENGLISH: THE LINGUISTIC APPROACH TO PROBLEMS OF CONTEMPORARY STRUCTURE (3)
Structure of the language, with specific reference to application in the teaching of English.

361, 362 THE ENGLISH NOVEL IN THE 19TH CENTURY (3)
(361) Scott, Austen, Dickens, Thackeray, the Brontes, Trollope. (362) Eliot, Meredith, Hardy, Conrad, Wilde, Bennett, Galsworthy.

ENGLISH *(Cont.)*

371, 372 Russian Literature (3)
Major developments since 1825. (371) Special attention to Pushkin, Lermontov, Gogol, Ostrovski, Turgenev, and Dostoyevski. (372) Special attention to Tolstoy, Chekhov, Andreyev, Gorky, Bunin, and Pasternak.

451*, 452* Victorian Literature (3)
(451) Prose and poetry from 1830 to 1860. (452) Prose and poetry from 1860 to 1900.

462* Regionalism: New England (3)
Selected works of the Transcendental Period and contemporary New England writers. Prerequisite: 41-42, or 321 and 322.

471*, 472* American Prose Fiction (3)
(471) Development of American novel and short story from their beginnings to 1880. (472) American novel and short story from 1880 to the present time. Prerequisite: English 41-42, or 321 and 322.

FINANCE (FIN)

301 Introduction to Business Finance (3)
The organization and financing of business enterprises. Corporate securities. Internal financial management. Prerequisites: Economics 11-2, Accountancy 201-2.

ADVANCED COURSES

Prerequisites: In addition to courses specified, Accountancy 201-2 or 621, and Economics 11-12 or 621, are prerequisites for all courses.

302 Financial Policies of Corporations (3)
Emphasis is placed upon financial management of the industrial corporation. Case problems in cash flow, budgeting, capital expenditure, expansion, and financial analysis. Prerequisite: Finance 301 or 621.

401* Investments (3)
Selection and analysis of investment securities for the individual investor. Emphasis on methodology, decision-making and portfolio management. Prerequisites: Economics 301 and Finance 301 or 621.

408* Financial Institutions (3)
Identification and analysis of problems of management, organization, capital structures, and credit analysis of commercial banks, savings and loan associations, life insurance companies, sales finance companies, and investment banking with opportunity for students to accomplish special research in area of choice. Prerequisities: Finance 301 or 621 and Economics 301.

431* Real Estate (3)
Types of interests in real estate. Principles of leasing, purchasing, selling, valuation, financing, property management, construction and development of individual and business real estate property. State and federal regulation. Prerequisites: Finance 301 or 621 and 3 advanced credit hours Business Administration.

351 Principles of Insurance (3)
Principles underlying all insurance—risk bearing and the theory of probability. General analysis of the principal types of commercial insurance—life, fire, casuality, marine suretyship and others.

FINANCE *(Cont.)*

523* FAMILY FINANCIAL SECURITY (3)
See Education 523*. Credit not applicable to the M.B.A. degree.

621* GRADUATE SURVEY IN FINANCE (3)

FINE ARTS (FA)

11-2 IDEAS IN WESTERN ART, VISUAL AND MUSICAL (3)
Development of concepts necessary for the analysis and appreciation of the great works of art, architecture, and music.

FRENCH (FR)

101, 102 BEGINNER'S COURSE (4)
Objective: ability to read French without translation, with practice on speaking and writing.

141, 142 ELEMENTARY FRENCH CONVERSATION (1)
Oral practice.

ADVANCED COURSES

French 101 and 102 or their equivalents or two years of high school French are the minimum prerequisites for all advanced French courses.

201, 202 SECOND YEAR FRENCH (3)
Reading from modern writers. Review of grammar.

241, 242 CONVERSATIONAL FRENCH (1)
Practical use of every day French.

301, 302 FRENCH LITERATURE OF THE 17TH, 18TH, 19TH, AND 20TH CENTURIES (3)
Novel, drama, and poetry. Prerequisite: French 202.

321 FRENCH WRITING (2)
Required of Education majors and minors and of Arts and Science majors. Grammar review. Original compositions. Translation from English. Prerequisite. French 202.

361, 362 FRENCH PRONUNCIATION AND DICTION (1)
Scientific study of French pronunciation and intonation. Corrective exercises, laboratory work. Conducted entirely in French. 2 Lab.

GEOGRAPHY (GEO)

11-12 ESSENTIALS OF MODERN GEOGRAPHY (3)
Significant similarities and differences throughout the human habitat, as a basis for understanding man's activities. Principles underlying distribution of and relations between physical and cultural elements of the habitat.

GEOGRAPHY *(Cont.)*

ADVANCED COURSES

Advanced courses in geography are open to students who have had 6 credit hours of geography, or 6 of anthropology, economics, government, history, sociology, or geology, or are of junior or senior standing.

261 GEOGRAPHY OF NORTH AMERICA (3)
Physical and cultural topical analysis of the United States and Canada, including such topics as climate, physiography, manufacturing, and agriculture.

271 CONSERVATION OF NATURAL RESOURCES (3)
Current problems associated with the conservation of the soil, forest, water, and mineral resources of the United States.

332 CLIMATOLOGY (3)
Classification of climates; climates of various areas.

414* GEOGRAPHY OF THE U.S.S.R. (3)
Analysis of the physical environment, population, regional differentiation, and world significance of the territory of the Soviet Union.

GEOLOGY *(GL)*

11-12 PRINCIPLES OF GEOLOGY (3)
2 lectures, 1 lab.

ADVANCED COURSES

201 INVERTEBRATE PALEONTOLOGY (3)
Biology and occurrence of fossils. Prerequisite Geology 12. 2 lectures, 1 lab.

231 MEGASCOPIC PETROGRAPHY (3)
Study and classification of igneous, metamorphic and sedimentary rocks based on megascopic characteristics. 2 lectures, 1 lab.

301 CRYSTALLOGRAPHY (3)
Symmetry classes and crystal notation. Projection and measurement techniques. Natural crystal examples. Prerequisites: Chemistry 101-2, Mathematics 112. 2 lectures, 1 lab.

302 MINERALOGY (3)
Physicial and chemical techniques in mineral identification. Prerequisite: Geology 301. 2 lectures, 1 lab.

NOTE: Lecture-laboratory session ratios in 201, 231, 301, and 302 vary considerably at different stages of each course. Several prerequisites may be met by simultaneous enrollment after student consultation with staff.

GERMAN (GER)

101, 102 BEGINNER'S COURSE (4)
Easy reading, speaking, and writing. Extensive reading.

142 ELEMENTARY GERMAN CONVERSATION (1)
Oral practice. Prerequisite: German 101.

ADVANCED COURSES

German 101 and 102 or their equivalents or two years of high school German are the minimum prerequisites for all advanced courses.

201, 202 SECOND YEAR GERMAN (3)
Intermediate readings. Speaking and writing German.

241, 242 GERMAN CONVERSATION (1)
Practice in oral German. May be taken concurrently with German 201-2.

301 19TH CENTURY PROSE (3)
Short stories of representative writers. Prerequisite: German 201-2.

315, 316 SCIENTIFIC GERMAN (2)
Reading in scientific and technical German and in student's special field. Prerequisite: German 201-2.

321, 322 GERMAN WRITING (2)
Composition, with special attention to form, syntax and style. Prerequisite: German 202 or its equivalent.

GOVERNMENT (GOV)

11-12 AMERICAN GOVERNMENT: INTRODUCTION TO GOVERNMENT AND POLITICS (3)
Origin and primary function of government; analytical comparison of governmental structures at different levels; rights and duties of citizens.

241, 242 INTERNATIONAL POLITICS (3)
Introduction to international politics with emphasis on factors which influence behavior at the international level.

261 MODERN POLITICAL IDEOLOGIES (3)
Introductory and comparative analysis of the ideologies of the major political systems under which men live: monarchy, elitism, democracy, totalitarianism, communism, socialism, welfare statism.

305-6 COMPARATIVE MODERN GOVERNMENT (3)
Principles and dynamic forces of modern government.

461* POLITICS: PARTIES, ELECTIONS AND PRESSURE GROUPS (3)
Role, institutions, and processes of politics in the American political system, with a comparative analysis of politics in other systems, democratic and non-democratic.

The following starred courses require an introductory course in government and 6 credit hours of advanced work in government or other social sciences.

491*, 492* CONTEMPORARY PROBLEMS (3)

HISTORY (HST)

NOTE: With permission of the department chairman, the second semester of a two-semester course may be taken before the first semester; credit is given for either semester of 11-12 and 21-22 if not used for the Common Curriculum requirement.

11-12 GROWTH OF AMERICAN CIVILIZATION (3)
Survey of the interplay of forces that have brought about the evolutionary development of American economic, cultural and political history from 1492 to the present. A functional and synoptic treatment of America's great historical problems. First semester to 1865.

21-22 ESSENTIALS OF WESTERN CULTURE (3)
Survey of European culture from Hellenic civilization to the present with emphasis on art, literature, philosophy and great movements. A course in "Ideas and Men" and forces that made the West what we find it.

ADVANCED COURSES

Advanced courses are open to those who have had 6 credit hours of history, or 6 credit hours of economics, government, geography, or sociology, or are of junior or senior standing. For courses in European history the following may also be offered for prerequisites: Religion 311, 312, Philosophy 301, 302.

Starred courses require 12 credit hours of history, or a combination in social sciences (related fields mentioned under advanced courses), and are open only to juniors, seniors, and graduates. Six of the 12 credit hours must be in advanced courses.

261 SURVEY HISTORY OF OHIO (3)
Important events and movements that have shaped the course of Ohio under the French and English, as an American colonial territory, and as a state. Consideration of the factors leading to the political, agricultural and industrial importance of the state.

307, 308 LATIN AMERICA (3)
(307) Backgrounds, discovery and conquest, colonial institutions, revolution, and emerging nationalism to about 1890. (308) Modern Latin America, with emphasis on twentieth-century social, political, and economic revolutions.

331 EUROPE FROM 1789 TO 1870 (3)
Principal political, social and cultural aspects of European development from the French Revolution to the unification of Germany, stressing especially the growth of liberalism and nationalism.

333 EUROPE FROM 1914 TO 1945 (3)
World War I, the search for security, failure of peace movements, rise of totalitarianism of the 20th century, American involvements, and World War II.

334 EUROPE SINCE 1945 (3)
Contemporary European history with emphasis on the aftermath of World War II, the evolution of defense and economic policies, relations with the United States, internal problems of the major powers, and liquidation of imperialism.

351* CIVIL WAR AND RECONSTRUCTION, 1850-1877 (3)
Abolition movement; secession; life during the war; the sectional influences that shaped reconstruction.

HISTORY *(Cont.)*

353*, 354* Twentieth Century America (3)
(353) Social, economic, and political development of the United States in the Progressive Era, World War I, and the Republican ascendency, 1900-1933. (354) The New Deal, World War II, and postwar era, 1933 to the present.

363* The Old South, 1763-1850 (3)
Local institutions in the South before the Civil War; influence of the plantation and slavery stressed.

422* Modern European Culture (3)
Intellectual history from the late Middle Ages to the present, including such topics as the outlook of Medieval Christendom, the Age of Reason, the impact of science on modern thought, etc.

425* European Background of American History (3)
Survey of European and English history with emphasis on development of American colonial period beginning with the Reformation, closing about 1800. Representative subjects: Puritanism, mercantilism, international diplomacy.

436* Modern Britain (3)
British history from the later 18th to the middle 20th century, with emphasis on political, social, and cultural developments of the Victorian Age.

INDUSTRIAL TECHNOLOGY *(IT)*

151-2 Engineering Graphics (3)
(151) Applied geometry, lettering, orthographic drawing, pictorials, auxiliaries, sections, dimensioning, working drawings. (152) Descriptive geometry, graphical solutions. 2 lecture labs.

LATIN—See CLASSICS

LIBRARY SCIENCE (LS)

Prerequisite for all courses: English 11-12 or English 15-16.

321 Cataloguing and Classification for School Libraries (3)
Instruction and practice in the preparation of library materials.

322 School Library Organization and Administration (3)
Administration of materials, staff, plans and equipment; standards and certification; the place of the library in the school.

421 Reference Materials and Bibliography in the School Library (3)
Important reference works, indexes, and bibliographies with practical problems in their use.

422 Book Selection in the School Library (3)
Evaluation, selection and purchase of books and other materials.

431 Library Practice (3)
Supervised practice.

INDUSTRIAL MANAGEMENT (IM)

301 Introduction to Industrial Organization and Management (3)
General nature and functions of organization and management in American industry with underlying trends. Prerequisite: Economics 11-2.

302 Production Management (3)
Principles applied to plant location, buildings, layouts, equipment, production control, purchasing, budgets, sales and control through costs. Prerequisite: Management 301.

401* Personnel Administration (3)
Objectives, functions, and organization of a typical personnel program in modern business enterprise. Prerequisites: Management 301, and 3 advanced credit hours Business Administration.

402* Personnel Techniques and Standards (3)
Special attention to job analysis, job evaluation, administration of wages and hours, merit rating, etc. Prerequisite: Management 401.

421* Supervisory Management (2)
Functions and responsibilities of the supervisor. Prerequisite: Management 302.

422* Problems in Industrial Management (2)
Solving actual problems of production, employing, safety, education and training, wages, etc. Prerequisite: same as 421.

451* Production Methods and Control (3)
Principles and techniques of management; current practices in production planning, routing, scheduling, etc. Prerequisite: same as 421.

600* Seminar (3; maximum 12)
Study of selected problems.

600* A Seminar in Management Philosophy and Applications (3)

600* B Seminar in Organizational Behavior (3)

600* C Seminar in Production and Industrial Management (3)

600* D Seminar in Personnel and Industrial Relations (3)

621* Graduate Survey in Industrial Management (3)

MARKETING MANAGEMENT (MKT)

301 Principles of Marketing (3)
Factors involved in the management of the marketing function relative to product development, promotion, pricing, physical distribution, and the determination of marketing objectives within the framework of the marketing system and available markets. Prerequisites: Economics 11-12.

302 Sales Administration (3)
Principles employed by manufacturers in the administration of a sales force. Prerequisite: Marketing 301.

336 Salesmanship (2)
Principles underlying the philosophy and techniques of personal selling. Prerequisite: Marketing 301.

MARKETING MANAGEMENT *(Cont.)*

ADVANCED COURSES

Prerequisites: In addition to courses specified, Business 301 and Marketing 301 or 6 hours of advanced credit in Business or related fields for all courses.

421* INTERNATIONAL MARKETING (3)
Extension of marketing activities into foreign fields; foreign market studies; regional potentials; organization, buying and sales promotion, order-filling, financing, and other practices connected with exporting and importing.

441* ADVERTISING PROCEDURE (3)
Advertising as a communication tool in marketing management. Emphasis is placed on decision making relative to copy, media selection, budgets, and on the appraisal of advertising effectiveness.

451* MARKETING RESEARCH (3)
Fundamental principles and techniques employed in the conduct and analysis of qualitative marketing surveys.

461* PRINCIPLES OF RETAILING (3)
Principles of retail management with particular emphasis on the merchandising practices of department and specialty stores. The contribution of effective retailing to the consumer and to the over-all economy.

471* INDUSTRIAL MARKETING (3)
Nature, evolution, and functions of industrial marketing and wholesaling operations; market structure, pricing, promotion, governmental, economic, and ethical aspects.

492* MARKETING POLICY (3)
Case course dealing with problems in all phases of marketing.

501*, 502 SEMINAR IN MARKETING (2-3)
Special investigations and analysis of current developments in marketing. Prerequisite: same as for 492*.

621* GRADUATE SURVEY IN MARKETING (3)

MATHEMATICS (MTH)

105 INTERMEDIATE ALGEBRA (3)
Basic algebra. Open only to students with less than one and one-half years of high school algebra.

106 COLLEGE ALGEBRA (3)
Open only to students with less than three years of college preparatory mathematics in high school. Must be taken simultaneously with Math 107, except in the Academic Center.

107 TRIGONOMETRY (2)
Open only to students without a course in trigonometry in high school. Must be taken simultaneously with Mathematics 106, except in the Academic Center.

112 CALCULUS (5)
Brief review of algebra, introduction to analytic geometry, functions, limits, the derivative with applications, the definite integral.

MATHEMATICS *(Cont.)*

119 CALCULUS (3)
Brief review of algebra, introduction to analytic geometry, functions, limits, the derivative with applications.

121, 122 ASTRONOMY (3)
Astronomy of the solar system. Stellar astronomy.

NOTE: The sequence Mathematics 119, 251, and 252 is the equivalent of the sequence Mathematics 112 and 201. Mathematics 201 can be taken after 112 or 251 and Mathematics 202 after 201 or 252.

161, 162 MATHEMATICAL APPLICATIONS IN BUSINESS AND ECONOMICS (3)
Topics in the mathematics of investment. Introduction to vector algebra, matrix algebra, and the elements of linear programming. Selected topics in analytic geometry and calculus. Applications to problems in economics, business, statistics, and related fields. Prerequisite: Mathematics 105 or one and a half years of high school algebra.

171, 172 MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS (3)
Topics from arithmetic, geometry, algebra, and number theory. Designed to provide a background for mathematical instruction in the elementary grades. Open only to elementary education majors.

ADVANCED COURSES

201 CALCULUS (5)
Continuation of Mathematics 112. Basic properties of continuous and differentiable functions, formal integration, further topics in analytic geometry, applications. Prerequisite: Mathematics 112 or 251.

202 CALCULUS (3)
Continuation of Mathematics 201. Infinite series, solid analytic geometry, vectors, partial differentiation, multiple integration. Prerequisite: Mathematics 201 or 252. Must be taken simultaneously with Mathematics 301, except in the Academic Center.

209 ADVANCED CALCULUS (3)
A rigorous presentation of limits, derivatives, mean value theorems, definite integrals, sequences and series. Must be taken simultaneously with Mathematics 211, except in Academic Center.

211 FOUNDATIONS OF MATHEMATICS (2)
Introduction to mathematical proof. Theory of sets, functions, and other selected topics. Prerequisite: Mathematics 152 or 201 or 252. Must be taken simultaneously with Mathematics 209, except in the Academic Center.

251, 252 CALCULUS (3)
Continuation of Mathematics 119. The definite integral, basic properties of continuous and differentiable functions, formal integration, further topics in analytic geometry, applications. Prerequisite: (251) Mathematics 119; (252) Mathematics 251.

261 STATISTICS (3)
The principles of statistics presented from a mathematical point of view. Prerequisite: Mathematics 201 or 252.

MATHEMATICS *(Cont.)*

ADVANCED COURSES

301 DIFFERENTIAL EQUATIONS (2)
Theory of ordinary differential equations with applications. Prerequisite: completion of or concurrent registration in Mathematics 202. Must be taken simultaneously with Mathematics 202, except in the Academic Center.

311* LINEAR ALGEBRA (3)
Finite dimensional vector spaces, linear transformations, matrix algebra, geometric applications. Credit does not count toward the M.A. or M.S. degree in mathematics.

MUSIC (MUS)

101-2 THEORY OF MUSIC (3)
A unified course, including written exercises, form and analysis, and keyboard harmony. Required of music majors, but open to all students in the University.

131-2 INTRODUCTION TO POPULAR CONCERT LITERATURE (3)
A survey of representative compositions of those composers, chiefly of the 19th century, whose works are most frequently performed in current solo, chamber and symphonic programs. Introduces the popular masterworks to students with little or no previous musical experience.

151-2 SIGHT SINGING AND DICTATION (1)
Required of all music majors concurrently with Music 101-2.

165 ELEMENTARY MUSIC (3)
Theory, sight singing, and appreciation. For four-year elementary education students.

328 MUSIC IN THE FIRST SIX GRADES (3)
Rote songs, rhythmic and tonal problems in successive years.

PHILOSOPHY (PHL)

11-12 INTRODUCTION TO PHILOSOPHY (3)
(11) Classical and (12) contemporary problems and methods.

NOTE: Either semester of Philosophy 11-12 may be taken first. In Philosophy 11-12 credit is granted for either semester separately except in meeting Common Curriculum requirements.

123 LOGIC (3)
Theory and practice in valid thinking. Study of scientific research methods.

PHILOSOPHY *(Cont.)*

ADVANCED COURSES

Prerequisites: Philosophy 11-12 or junior or senior standing.

301, 302 HISTORY OF PHILOSOPHY (3),
(301) Foundations of philosophical thought in Greek, Roman, and medieval times.
(302) The development of modern thought from the Renaissance to recent times.

311 ETHICS (3)
Survey of Oriental, Greek, Christian and modern philosophies of life; construction of individual conception of the good life.

392 PHILOSOPHY OF RELIGION (3)
Inquiry into major philosophical problems relating to religion, as these have arisen in the modern intellectual milieu. Readings in prominent thinkers, such as Spinoza, Leibniz, Hume, Kant, Kierkegaard, and Nietzsche.

PHYSICAL AND HEALTH EDUCATION (PEW)

281 (PEW) PHYSICAL EDUCATION FOR THE ELEMENTARY SCHOOL (2)

Methods and materials in activities for elementary school programs. (Required of sophomores in Elementary Education.)

PHYSICS (PHY)

11-12 INTRODUCTORY PHYSICS (3)

Development of physics. Impact of modern physics upon society. For non-science majors. 2 lectures with demonstrations.

101-2 COLLEGE PHYSICS (4)

Fundamental principles and laws analyzed and applied to the solution of problems met in nature and in the laboratory. Prerequisite: high school algebra and geometry. Meets minimum pre-medical requirements in physics. 2 lectures, 1 lab.

151-2 GENERAL PHYSICS (5)

For science and engineering students. Prior completion of Mathematics 112 or 151 required. 3 lectures, 1 lab.

224 STATICS

Resultants, equillibrium, trusses, frames, machines, centroids, friction, shear and bending moment diagrams, inertias. Prerequisite: Physics 151 and/or concurrently with Math 202-301.

PHYSIOLOGY (PHS)

11 PRINCIPLES OF BIOLOGY (3)
Principles of biology as exemplified by animals and plants. 2 lectures, 1 lab.

201 CELL BIOLOGY (5)

Elements of plant, animal, and microbial cell structure with emphasis on functional inter-relationships. Laboratory exercises are designed to acquaint the student with modern methods of preparing cells and tissues for microscopic examination and the study of elementary physiological phenomena. Prerequisite: Physiology 11-12 or consent of instructor. 2 lectures, 2 labs.

202 DEVELOPMENTAL BIOLOGY (5)

Elements of plant and animal tissue organization with emphasis on embryological origin and the regulatory mechanisms concerned with growth and differentiation.

Included are aspects of botany, zoology, and micro-biology in the areas of histology, cytology, embriology, anatomy, and endocrinology as they relate to the total complex of cell growth and development leading to the organization of multicellular organisms. 2 lectures, 2 labs.

381 PHYSIOLOGY, HEALTH, AND NUTRITION (3)
Brief outline of elementary physiology, accompanied by a study of conditions favorable and unfavorable to normal activities. Prerequisite: Physiology 11-12 or the equivalent.

PSYCHOLOGY (PSY)

11-12 ELEMENTARY PSYCHOLOGY (3)
Study of human behavior and experience.

ADVANCED COURSES

211 CHILD PSYCHOLOGY (3)
Problems of normal child development.

212 ADOLESCENT PSYCHOLOGY (3)
Development and problems of the adolescent.

232 BEHAVIORAL STATISTICS (3)
Statistics applied to psychological data.

321 PERSONALITY AND ADJUSTMENT (3)
Bases of personality; maladjustments and integration of the normal individual.

322 SOCIAL PSYCHOLOGY (3)
Psychological factors in group adjustments and relationships.

391 PHYSIOLOGICAL PSYCHOLOGY (3)

Survey of the physiological mechanisms of behavior. Emphasis on action and the integration of behavior, motivation, emotion, and learning.

452* PSYCHOLOGY OF THE EXCEPTIONAL CHILD (3)
Problems of retarded, gifted, physically handicapped, and emotionally disturbed children. Prerequisite: Psychology 211.

481-2 INDEPENDENT READING (3)

RELIGION (REL)

11-12 RELIGIOUS ROOTS OF WESTERN CULTURE—PROBLEMS IN WESTERN RELIGIOUS THOUGHT (3)
(11) An introduction to the major themes of Western religious traditions, examined through the original and classical literature in which these themes have arisen. Readings in Jewish, Graeco-Roman, and Christian sources. (12) Major problems and issues in contemporary Jewish and Christian thought, with reference to major historic contributions.

NOTE: Religion 12 presupposes 11, but a student may receive credit for 11 without completing 12, if not used to fulfill Common Curriculum requirement.

ADVANCED COURSES

Religion 11-12, or 111, 112, or junior or senior standing, is the minimum prerequisite for advanced courses in religion.

311, 312 WORLD RELIGIONS (3)
(311) Religions of the Mediterranean area including ancient Egypt, Babylonia, Persia, Greece and Rome; Judaism, Christianity and Islam. (312) Religions of the Orient including India, China, and Japan. Open to juniors and seniors only.

392 PHILOSOPHY OF RELIGION (3)
See Philosophy 392.

SOCIAL STUDIES (SOS)

ADVANCED COURSES

Prerequisite: 6 credit hours in any social science. Graduate credit requires an additional 6 credit hours of advanced work in any social science.

361 DEVELOPMENT OF THE AMERICAN ECONOMY (3)
Economic problems, their historical development, and their significance in contemporary society.

362 DEVELOPMENT OF AMERICAN GOVERNMENT (3)
Problems of maintaining peace and order through the institutions of government, their historical development, and relation to selected political developments in other nations and world organizations.

523* FAMILY FINANCIAL SECURITY (3) See Guidance and Special Education 523*

SOCIOLOGY AND ANTHROPOLOGY (SOC)

11-12 INTRODUCTORY SOCIOLOGY (3)
Principles and problems of normal social life. Admits to all sociology courses.

21-22 GENERAL ANTHROPOLOGY (3)
Survey of physical and cultural anthropolgy, archaeology, and related topics.

301 SOCIAL PATHOLOGY (3)
Causes, extent, treatment, and prevention of selected social problems. Field trips. Special reports.

361 FAMILY AND MARRIAGE (3)
Analysis of family behavior in the U.S., emphasizing courting, marrying, child-rearing and tensions. Prerequisite: Upper class standing or 11-12.

SPANISH (SPN)

101, 102 BEGINNER'S COURSE (4)
Objective: to read and understand ordinary Spanish without translation and to speak and write it with increasing ability. Not open to students who have presented two or more units of high school Spanish for a high school diploma.

ADVANCED COURSES

Spanish 101 and 102 or their equivalents or two years of high school Spanish are the minimum prerequisites for all advanced Spanish courses.

201, 202 SECOND YEAR SPANISH (3)
Reading and discussion of selected texts, with practice in speaking and writing the language.

221, 222 SPANISH GRAMMAR REVIEW AND CONVERSATION (2)
Basic review to improve the student's ability to write and speak Spanish. Concurrent enrollment with Spanish 201, 202 or with 301, 302; recommended for majors. Students who feel deficient in first-year Spanish are urged to enroll in 221, 222 either prior to or concurrently with 201, 202.

301, 302 MASTERPIECES OF SPANISH LITERATURE (3)
Survey course: (301) 1700 to the present; (302) from the beginning to 1700. Readings, lectures, reports, and discussions. Prerequisite: 202, four units of high school Spanish, or equivalent.

321, 322 SPANISH COMPOSITION (2)
Oral and written composition in Spanish; translations from English into Spanish. Further grammar study. Prerequisite: Spanish 222 or equivalent.

331 SPANISH-AMERICAN LITERATURE (2)
Reading of poetry, novels and plays from colonial times to the end of the 19th century. Prerequisite: Spanish 202.

351 DON QUIXOTE IN ENGLISH TRANSLATION (3)
Intensive reading of *Don Quixote* in English translation. Background lectures, discussions, and reports on Cervantes and his time. Juniors and seniors only.

SPEECH (SPC)

111, 112 INTERPRETATION OF LITERATURE (2)
A service course in the interpretation of prose and poetry.

125 SPEECH DEVELOPMENT AND DISORDERS (2)
Scientific knowledge about the speech act, the developmental sequence, speech and hearing disorders. Not credited toward a major sequence in Speech and Hearing Therapy.

126 FUNDAMENTALS OF COMMUNICATION (3)
To establish standards of effectiveness in the basic oral communicative activities: reading aloud, discussion and public speaking. Restricted to Elementary Education.

135, 136 ESSENTIALS OF PUBLIC SPEAKING (3)
Basic course of the department.

SPEECH *(Cont.)*

ADVANCED COURSES

All advanced courses have a prerequisite of one year in the department.

201, 202 ACTING (2)
Theory and application of acting on the stage.

231 DISCUSSION METHODS (2)
Theory and practice of the round-table, panel, and forum.

425* SPEECH PROBLEMS OF SCHOOL-AGE CHILDREN (3)
Practical approaches to problems encountered by teacher, nurse, or parent. Offered in Academic Centers only. Not for majors in the field. Prerequisite: 12 credit hours of speech or provisional certificate.

COURSES OF INSTRUCTION
IN THE
OHIO STATE UNIVERSITY
GRADUATE CENTER

Explanation of Course Listings

The following list of proposed course offerings for 1965-66 are those for which there is evidence of need as obtained from students, advisors and management. A supplemental announcement of specific course offerings is issued for the Autumn, Winter, Spring and Summer Quarters. These announcements are available at the Dayton Campus. Course offerings are subject to change depending upon student interest.

In some cases whereby a course is normally offered for more than three quarter hours on campus it may be offered in two quarters at the Graduate Center using A and B as a suffix to the number to indicate this.

Numbers in parentheses (3) indicate quarter hours of credit.

ACCOUNTING

643 (3) 644 (3) INTRODUCTION TO MANAGEMENT ACCOUNTING. Open only to students with a baccalaureate degree who are preparing for the degree of M.B.A. in the department of Bus Org. Not for graduate credit.
A survey of accounting principles from a viewpoint of management; income measurement; analysis and interpretation of accounting data, internal accounting reports.

801 (3) BUSINESS CONTROLS. Not for graduate credit for majors in Acc.
Examination of business planning and the controls over operations and property. The use of accounting data in the management enterprise. *Prereq: 644 or Equiv. and Econ 542 (Statistics) or Equiv.*

ASTRONOMY

605 (3) INTRODUCTION TO CELESTIAL MECHANICS.
Application of the laws of motion to planets, satellites, and stars. The two, three, and-n-body problems. Introduction to orbit and perturbation theory. *Prereq: Math 538 (Calculus) and Physics 412-413 (General & Modern Physics)*

950 (1-6) RESEARCH IN ASTRONOMY AND ASTROPHYSICS.
Research for thesis or dissertation purposes only.

AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

688a (3) AEROMECHANICS.
Introduction to the nature and properties of aerodynamic fluids from microscopic and macroscopic points of view. *Prereq: 682 (Elements of Aeronautics & Astronautics)*

700a (3) AEROKINETICS
Derivation of fundamental equations governing internal and external aerodynamic flows. *Prereq.: 688.*

705a (3) AEROTHERMOCHEMISTRY I
The aerodynamics of one-dimensional compressible flow from the molecular-kinetic point of view including chemical reactions in the fluid. *Prereq.: 700.*

707a (3) COMPRESSIBLE AERODYNAMICS
The fundamentals of the aerodynamics of compressible fluids. *Prereq.: 705, 708.*

708a (3) CLASSICAL AERODYNAMICS
Fundamentals of steady and unsteady incompressible, nonviscous areodynamic flows with applications to oscillating airfoils and finite wings. *Prereq.:700.*

729a (3) MOTION AND DEFORMATION OF FLIGHT VEHICLES
Derivation of the basic equations and methods of analysis governing the motions, deformations, and resulting stresses encountered by flight vehicles. *Prereq.: 683, Eng. Mech. 617, Math 622.*

AERONAUTICAL AND ASTRONAUTICAL ENGINEERING *(Cont.)*

730 (3) FLIGHT VEHICLE STRUCTURES
Stress and deformation analysis of light weight structures for flight vehicles under static and dynamic loadings. *Prereq.: 729.*

754a (3) AEROELASTICITY.
Dynamic loads analysis of elastic flight vehicles subjected to unsteady airloads. *Prereq: 708 (Classical Aerodynamics) and 730 (Flight Vehicle Structures)*

755a (3) AEROELASTICITY
Continuation of 754. *Prereq.: 754.*

775a (3) AERODYNAMICS OF VISCOUS FLUIDS I
The elements of laminar and turbulent boundary layers in incompressible flows. *Prereq.: 707.*

766a (3) AERODYNAMICS OF VISCOUS FLUIDS II
Advanced problems in boundary layer flows. *Prereq.: 775.*

777a (3) SUPERAERODYNAMICS
Molecular theory of flow, rarefied gas phenomena, aerodynamic forces and heat transfer in rarefied gas flow. *Prereq.: 707.*

778a (3) AERODYNAMIC HEATING
The analysis of laminar and turbulent boundary layer heat transfer in high speed flow. *Prereq.: 775.*

779a (3) HYPERSONIC FLOWS
Prereq.: 772 and 775.

787a (3) ANALYTICAL DYNAMICS OF ASTRONAUTICS I
The dynamical analysis of spacecraft trajectories and orbits including atmospheric re-entry. *Prereq.: 729 or equiv.*

788a (3) ANALYTICAL DYNAMICS OF ASTRONAUTICS II
Drag estimation, transfer orbits, perturbations, and three-body problems. *Prereq.: 787 or equiv.*

789a (3) HYPERSONIC FLOWS
Continuation of 779. *Prereq.: 779.*

799 (2-6) SPECIAL PROBLEMS IN ADVANCED AERONAUTICAL AND ASTRONAUTICAL ENGINEERING. Repeatable to a maximum of 15 cr hrs.
This course is designed to give the advanced student opportunity to pursue special studies in aeronautical and astronautical engineering. Work may be taken under one or more of the special topics of the field, including aircraft structures, aerodynamics, propulsion, flutter and vibration, and stability and control.

950 (1-6) RESEARCH IN AERONAUTICAL AND ASTRONAUTICAL ENGINEERING.
Research for thesis or dissertation purposes only.

BUSINESS ORGANIZATION

621 (3) BUSINESS LAW: CONTRACTUAL RELATIONSHIPS. Role of law in business. Analysis of legal principles and decisions relating to business agreements, their formation, performance and enforcement. *Prereq: Econ 402 (Principles of Economics)* Not for graduate credit for majors in Bus Org or Acc.

625 (3) BUSINESS LAW: COMMERCIAL PAPER AND SALES
Analysis of cases and provisions of the Uniform Commercial Code relating to commercial paper, including checks and notes; sales of personal property and related transactions. *Prereq.: 621.*

655 (3) PRINCIPLES OF INVESTMENT
Nature and types of investments; objectives and programs; prices and yields; timing; taxes; supervision. *Prereq.: 730.*

676 (3) PRINCIPLES OF MANAGEMENT. An intensive examination of the basic fundamentals of organization and management underlying the solution of management problems *Prereq: Econ 402 (Principles of Economics) and Acc 402 (Principles of Accounting)* Not open to students who have credit for 680.

677 (3) INDUSTRIAL ORGANIZATION AND MANAGEMENT. Plant location, product and process planning, materials handling, physical facilities, production control, quality control, inventory control, utilization of materials and personnel in industrial organization. *Prereq: 676.* Not open to students who have credit for 680.

682 (3) SUPERVISORY MANAGEMENT
Managerial, technical, and human relations functions and responsibilities of the first level of management as exemplified by the foreman and supervisor. *Prereq.: 677.*

685 (3) PURCHASING, STORES, AND INVENTORY CONTROL
Objectives, principles, and methods of managing the function of procurement and of supply. Planning of materials requirements, purchasing, receiving, storing, and disbursing. *Prereq.: 615, 677.*

686 (4) PERSONAL ORGANIZATION AND MANAGEMENT. Principles and practices of line and staff executives in managing the procurement, development, maintenance, and utilization of an effective and satisfied working force. *Prereq: 676*

687 (4) PRODUCTION ORGANIZATION AND MANAGEMENT.
Examines the problem of coordinating sales, finance, and various technical staff services with the line function of production and its requirements. *Prereq: 685 (Purchasing, Stores & Inventory Control)*

691 (3) OFFICE ORGANIZATION AND MANAGEMENT. The planning, organizing, and controlling of office work; office standards, business forms, selection of business machines, analysis of office methods. *Prereq: 676.*

729 (3) MARKETING. A critical study of the field of marketing institutions and functions primarily from a social point of view. *Prereq: permission of instructor.* Open only to students preparing for graduate work in business.

730 (3) CORPORATION FINANCE. A critical study of the field of Corporation Finance from an economic point of view. *Prereq: permission of instructor.* Open only to students preparing for graduate work in business.

751 (3) MOTOR CARRIER ORGANIZATION AND MANAGEMENT. Management principles applied to the organization and operation of motor carrier enterprises. Current problems of customer relationships, competitive transportation agencies, and administrative law. *Prereq: 677.*

BUSINESS ORGANIZATION *(Cont.)*

799 (1-3) SPECIAL PROBLEMS IN BUSINESS ORGANIZATION. *Prereq: graduate standing or senior standing with a 2.5 point average in the field of specialization and permission of the instructor.* Repeatable.

800 (3) PRINCIPLES AND TECHNIQUES OF RESEARCH. Principles of research methods in business and the use of research by management. The scientific method in business, sampling theory, variable analysis, research cases. *Prereq: 676, 729, 730 and Econ 522 (Statistics)* Not open to students who have credit for 703.

802 (3) APPLICATIONS OF QUANTITATIVE METHODS IN BUSINESS
Applications of quantitative tools to the solution of recurring business management problems such as breakeven points, forecasting, capital budgeting, inventory control, and product mix. *Prereq.: 800 and permission of instructor.*

803 (3) ADVANCED FINANCE. A critical study of internal financial management of business enterprises, based primarily on comprehensive case analyses. *Prereq: 730.*

813 (3) ADVANCED MARKETING. A critical study of management of marketing activities in business enterprises, based primarily on comprehensive case analyses. *Preq: 729.*

835 (3) ADVANCED INDUSTRIAL MANAGEMENT. A critical survey and examination of the current trends and advanced problems in the organization and management of industrial enterprises. *Prereq: 677.*

838 (3) PERSONNEL RELATIONS. Analysis of interpersonal relations, personnel programs and policies, communication practices, and morale factors relative to the effect upon productivity, organizational effectiveness, and personal objectives. *Prereq: 676.*

840 (3) ADMINISTRATIVE PRINCIPLES. An examination of management fundamentals underlying decision-making with respect to the utilization of basic performance factors in the accomplishment of business objectives. *Prereq: 729, 730.*

841 (3) BUSINESS POLICY. Examination of fundamental factors in organization and management. Major policy decisions are analyzed. Effects of policy decisions on sales, production, personnel, and finances are investigated. *Prereq: admission to MBA program and permission of Graduate Committee.*

950 (1-6) RESEARCH IN BUSINESS ORGANIZATION.
Research for thesis or dissertation purposes only.

CERAMIC ENGINEERING

750 (1-6) SPECIAL PROBLEMS. Conference, library, and laboratory work. *Prereq: fundamental ceramic engineering courses and consent of department.* Repeatable to a total of 15 hours.

950 (1-6) RESEARCH IN CERAMIC ENGINEERING.
Research for thesis or dissertation purposes only.

CHEMICAL ENGINEERING

753 (3) 754 (3) CHEMICAL ENGINEERING THERMODYNAMICS. Elective to students in the Colleges of Arts and Education and in the Graduate School.
Application of the fundamental concepts and laws of thermodynamics to problems of the chemical industry. Stress is laid on computational problem work. *Prereq: Chem 690 (Physical Chemistry) or permission of the Instructor*

801 (1-6) ADVANCED SPECIAL PROBLEMS IN CHEMICAL ENGINEERING
A minor problems course covering the chemical engineering operation, instrumentation, thermodynamics, kinetics, the transport fields, and chemical technology. *Su, A, W, Sp. Conf., library and/or lab. Prereq.: Satisfactory course in the field of the problem undertaken. Repeatable.*

815 (3) ADVANCED CHEMICAL ENGINEERING SCIENCE AND APPLICATIONS. Repeatable to a maximum of 21 cr. hrs.
This series of courses presents advanced concepts of science and engineering as applied to the chemical engineering field under the following topics:

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

815A Advanced mass transfer—I
815B Advanced mass transfer—II
815C Advanced binary and multicomponent distillation
815D Extraction, azeotropic and extractive distillation
815E Advanced heat transfer—I, conduction, radiation and convection
815F Advanced heat transfer—II, condensation, boiling, design applications
815G Drying, humidification and dehumidification
815H Advanced momentum transfer—I, basic theory and laminar flow
815I Advanced momentum transfer—II, turbulence
815J Advanced momentum transfer—III, two phase phenomena
815K Advanced combustion principles
815L Advanced instrumentation and process control of chemical plants
815M Design of experiments, data handling and analysis, quality control, linear programming
815N Advanced process and plant design
815O New or unusual chemical engineering operations such as adsorption, atmolysis, dialysis, ion exclusion, sublimation

Prereq: 720-721 (Chemical Engineering Operations) and Math 609 (Fourier Series & Boundary Value Problems) or permission of the Instructor.

820 (3) 821 (3) ADVANCED CHEMICAL ENGINEERING THERMODYNAMICS.
Detailed discussion of the thermodynamic properties of pure compounds and mixtures. Computational problem work emphasizes the application of thermodynamics in industrial problems. *Prereq: 720 (Chem Engineering Operations) and 754 or permission of the Instructor.*

830 (3) ADVANCED CHEMICAL ENGINEERING KINETICS
Chemical engineering kinetics from the viewpoint of industrial chemical processes. *Prereq.: 720 (Chem. Eng. Operations) and 755 (Kinetics)*

831 (3) ADVANCED CHEMICAL ENGINEERING KINETICS
Continuation of 830. *Prereq.: 830.*

950 (1-6) RESEARCH IN CHEMICAL ENGINEERING.
Research for thesis or dissertation purposes only.

CHEMISTRY

701 (1-6) MINOR PROBLEMS IN CHEMISTRY. Conf, library and lab. A qualified student may conduct a minor investigation in Chemistry. *Prereq: satisfactory courses in field of the problem and permission of instructor.* A student may repeat this course and may spend all or a part of his time on it during a quarter.

761 (3) ADVANCED INORGANIC CHEMISTRY
An introduction to the concept and chemical systems of inorganic chemistry, including the periodic table, atomic structure, bonding, acid-base theories, co-ordination compounds, defect solid state, hydrides, organometallic compounds, etc. *Prereq.: 683 (Physical Chem.) or permission of instructor.*

762 (3) ADVANCED INORGANIC CHEMISTRY
Continuation of 761. *Prereq.: 761.*

763 (3) ADVANCED INORGANIC CHEMISTRY
A discussion of special topics in modern inorganic chemistry, including an introduction to the chemistry of substances in non-aqueous solvents, acid-base theory, and inorganic complex compounds. *Prereq.: 762.*

950 (1-6) RESEARCH IN CHEMISTRY.
Research for thesis or dissertation purposes only.

ECONOMICS

606 (3) CURRENT ECONOMIC PROBLEMS. Examination of current economic problems; optimum levels of employment; conditions underlying consumer expenditures; savings; investments; inflation; deflation, agriculture, public works, housing; regional development. *Prereq: 402 (Principles of Economics).* Not open to students who have credit for 604-605.

636 (3) PUBLIC FINANCE

670 (3) COMPETITION AND PUBLIC POLICY
Nature, role, and regulation of competition; market structure and social performance; antitrust laws; current economic, legal, and policy problems in the antitrust area. *Prereq.: 671 or 20 cr. hrs. of Econ.* Not open to students with credit for 609.

671 (5) GOVERNMENT AND BUSINESS.
Economic and legal aspects of Government regulation of business in the United States; philosophies and concepts of public control; contemporary problems. *Prereq: 402 (Principles of Economics)*

681 (3) COLLECTIVE BARGAINING
Collective bargaining procedures and issues; the handling and settlement of industrial disputes. *Prereq.: 683.*

683 (5) THE AMERICAN LABOR MOVEMENT. History and theory of American labor movement. Evolving attitudes toward collective bargaining. Trade union policies, programs, organization, and administration. *Prereq: 402 (Principles of Economics).* Not open to students who have credit for 637 or 694-695 or 780-781.

698 (3) SOVIET ECONOMIC SYSTEM. Survey of Soviet economics with major emphasis on planning; allocation of resources; spending, saving and investing; agriculture; public finances: and international trade. *Prereq: 402 (Principles of Economics).* Not open to students who have credit for 525 or 654.

ECONOMICS *(Cont.)*

699 (1-5) SPECIAL PROBLEMS IN ECONOMICS. Advanced courses in Econ. and related fields. 1-5 cr. hrs. each qtr. in any one field, repeatable to a maximum of 15 hrs.

(a) Economic Theory; History of Economic Thought
(b) Economic History, American and European
(c) Money and Banking
(d) Public Finance
(e) Economic Statistics; Econometrics
(f) Business Fluctuations; National Income Accounting
(g) International Economic Relations
(h) Public Control
(i) Labor
(j) Institutions and Methods of Economic Planning
(k) National Security Economics
(l) Special Fields to be arranged

707 (3) 708 (3) 709 (3) INTERMEDIATE ECONOMIC ANALYSIS. Review of the scope and nature of economic analysis; competitive and monopolistic markets in allocation of consumers' goods and inputs of the factors of production; coordination of basic economic processes at different output-levels. *Prereq: 520 (Money & Banking).* Not open to students who have credit for 601-602-603.

770 (3) ECONOMICS OF NATIONAL SECURITY. Analysis of economic problems arising from defense and war. Emphasis on implications of defense and war economy and on economic theory and institutions. *Prereq: 402 (Principles of Economics).* Not open to students who have credit for 691.

798 (1-5) SPECIAL STUDIES IN ECONOMICS. Advanced courses in Econ. and related fields. 1-5 cr. hrs. each qtr. in any one field. Not more than 5 cr. hrs. may be received in any one field nor a total of more than 15 hrs. in the course.

(a) Economic Theory; History of Economic Thought
(b) Economic History, American and European
(c) Money and Banking
(d) Public Finance
(e) Economic Statistics; Econometrics
(f) Business Fluctuations; National Income Accounting
(g) International Economic Relations
(h) Public Control
(i) Labor
(j) Institutions and Methods of Economic Planning
(k) National Security Economics
(l) Special Fields to be arranged

801 (3) HISTORY OF ECONOMIC THOUGHT
The historic role of economic ideas: the ancient world, mercantilism, physiocracy.

802 (3) HISTORY OF ECONOMIC THOUGHT
Adam Smith, T. R. Malthus, David Ricardo and their age. *Prereq.: 801.*

ECONOMICS *(Cont.)*

803 (3) History of Economic Thought
Extension and criticism of classical thought: socialism, the historical school, marginalism, Alfred Marshall. *Prereq.: 802.*

851 (3) Seminar in Business Fluctuations and National Income Accounting
Current business cycle theory and national income accounting; evaluation of statistical measures of these phenomena; consideration and appraisal of recent literature in the field. Not open to students with credit for 844.

852 (3) General Business Conditions Analysis
Theoretical and applied analysis of general economic conditions and their relation to decisions of the firm. *Prereq.: 20 cr. hrs. in Econ. and/or Bus. Org. and permission of instructor.* Not for graduate credit to majors in Economics.

950 (1-6) Research in Economics.
Research for thesis or dissertation purposes only.

ELECTRICAL ENGINEERING

612 (3) Circuit Theory I. Basic principles of linear circuit theory. Network equations and topology, phasor algebra, resonance and the analysis of transient and steady state behavior of simple circuits. *Prereq: Math 543 (Calculus), Physics 533 (General Physics), Math 608 (Differential Equations)* Not open for graduate credit for students majoring in Elec E.

613 (3) Circuit Theory II. Network theorems and network equivalence, magnetically coupled circuits, polyphase circuits and Fourier Series and Integral with circuit applications. *Prereq: 612.* Not open for graduate credit for students majoring in Elec E.

617 (3) Field Theory I. Vector relations, static electric fields, dielectric materials, boundary conditions, field mapping, steady electric currents and their magnetic fields, motion of charged particles. *Prereq: Physics 533 (General Physics) and Math 543 (Calculus)* Not open for graduate credit for students majoring in Elec E.

618 (3) Field Theory II. Ferromagnetic materials, time changing electric and magnetic fields, Maxwell's equations, relations between field and circuit theory, plane waves, Poynting vector, energy relations, boundary value problems. *Prereq: 617.* Not open for graduate credit for students majoring in Elec E.

626 (3) Electron Device Circuit Theory I. Elementary theory of electron device terminal characteristics; large and small signal analysis of electron devices as circuit components; applications to rectification and to amplification. *Prereq: 614 (Circuit Theory).* Not open for graduate credit for students majoring in Elec E.

627 (3) Electron Device Circuit Theory II. Multistage amplifier coupling; broadbanding; feedback analysis and applications; power amplifiers; Class B and C large signal analysis; single-frequency oscillators. *Prereq: 615 (Circuit Theory) and 626.* Not open for graduate credit for students majoring in Elec E.

707 (3) Advanced Circuits
Introduction to network synthesis. *Prereq.: 627.*

ELECTRICAL ENGINEERING *(Cont.)*

716 (3) Circuit Theory V.
Feedback systems, block diagrams and signal flow graphs, stability criteria, frequency response and pole-zero analysis; application of feedback to amplifiers and control systems; non-linear considerations. *Prereq: 615 (Circuit Theory), 628 (Electron Devices & Controls) and Math 544 (Differential Equations)*

731 (3) Magnetic Amplifiers
Theory and transient analysis of self-saturating magnetic amplifiers, system control and regulation, memory methods. *Prereq.: 652, 716; or 643 and 644, with permission of instructor.*

733 (3) Feedback Control Systems.
Application of feedback principles to control systems; performance criteria; compensation, carrier systems, multi-variable systems. *Prereq: 716 and 652 (Electrical Energy Conversion) and Math 611*

738 (3) Advanced Control Systems. Practical control systems with non-ideal components; non-linear systems. *Prereq: 733.*

739 (3) Microwave Circuits.
Advanced waveguides, waveguide devices, amplifiers, generators and detection devices; special microwave techniques. *Prereq: 619 (Transmission & Radiation) and 724 (Microwave Circuits)*

740 (3) Logic Circuit Theory.
Synthesis of switching circuits using Boolean Algebra, coding, sequential switching circuits. *Prereq: 628 (Electron Devices) and permission of the Instructor.*

742 (3) Theory and Design of Digital Computers. Number systems, introduction to computer programming, design of arithmetic units, counters, and digital control systems, use of redundant codes and redundant equipment. *Prereq: 740.*

743 (3) Communication Theory. Theory of communication, information content, frequency spectra, noise, methods of modulation, modulators, and demodulators. *Prereq: 628 (Electron Device Circuit Theory)*

760 (1-6) 761 (1-6) 762 (1-6) Advanced Theoretical Study in Electrical Engineering. *Prereq: permission of instructor.*

763 (3) Circuit Theory of Solid State Devices. Advanced circuit theory of solid state devices. *Prereq: 628 (Electron Device Circuit Theory) and 769 (Electron Device Physical Theory)*

768 (3) Electron Device Physical Theory I
Vacuum electron devices; potential distribution; device current analysis; vacuum device circuit parameters; electron and ion motion in vacuum devices; gaseous conductors. *Prereq.: 619, 627, Physics 610, and Eng. Mech. 617.*

801 (1-6) 802 (1-6) 803 (1-6) Advanced Theoretical Study in Electrical Engineering. *Prereq: permission of Instructor.*

815 (3) Transients in Linear Systems. Modern methods of solution of transient phenomena in electrical, mechanical, and thermal linear systems involving lumped and distributed parameters. *Prereq: 626, concur Math 601 or equiv.*

827 (3) Communication Theory I
The application of Fourier Series and Fourier Integrals to the analysis of circuit problems. Theory of random signals, auto-correlation, power density spectra, optimum filters. *Prereq.: 815, concur. Math. 607.*

ELECTRICAL ENGINEERING *(Cont.)*

828 (3) COMMUNICATION THEORY II
Continuation of 827. *Prereq.: 827 and Math. 607.*

830 (3) NETWORK SYNTHESIS I. Modern theory of network synthesis with applications to advanced design of filters, equalizers, and compensators. *Prereq: 815 and Math 607.*

831 (3) NETWORK SYNTHESIS II. A continuation of Electrical Engineering 830. *Prereq: 830.*

832 (3) FUNDAMENTALS OF ELECTROMAGNETIC THEORY.
Solution of Maxwell's equations by scalar, vector, and hertzian potentials. Plane waves in dielectrical conducting, and anisotropic media. Polarization, boundary value problems, radiation, and scattering. *Prereq: 619 (Transmission and Radiation)*

833 (3) ELECTROMECHANICAL SYSTEMS. Application of the methods of electric circuit analysis to mechanical, acoustical, electromechanical and electroacoustical systems. *Concur 815.*

834 (3) ANALYSIS OF NON-LINEAR SYSTEMS
An advanced study of methods of analysis of non-linear systems with applications in the field of electric circuit theory and control systems. *Prereq.: 815.*

847 (3) THEORY AND DESIGN OF FEEDBACK CONTROL SYSTEMS
Linear feedback theory, signal-flow graphs, return difference, stability studies with parameter variation, independent control of transmission and sensitivity functions, multi-variable systems, approximation methods. *Prereq.: 716 and 815, or permission of instructor.*

848 (3) SYNTHESIS OF LINEAR FEEDBACK CONTROL SYSTEMS
Sampled-data systems, the Z-transform, digital compensation; synthesis of systems with statistical inputs and constraints; advanced topics. *Prereq.: 847.*

850 (3) WAVE GUIDES AND RESONATORS. General theory of waveguides, modes, discontinuities, losses, cavities, and power considerations. *Prereq: 832.*

851 (3) RADIATION AND RADIATING SYSTEMS. Radiation theory; dipole, linear, loop, helical, biconical, and aperture antennas; beam shaping, aperture distribution, self and mutual impedance, microwave optics; radio telescope, antenna temperature. *Prereq: 832.*

852 (3) PROPAGATION OF ELECTROMAGNETIC WAVES
Advanced study of transmission and reception of radio waves in the presence of the earth and its atmosphere; tropospheric, ionospheric, and scatter propagation. *Prereq.: 756 and 832.*

854 (3) SOLID STATE ELECTRON DEVICES I.
Introduction to solid state electron devices; conduction mechanisms; magnetic effects; electrical properties of imperfections; dynamics of single crystals at high temperatures; control of impurity distributions. *Prereq: 628 (Electron Device Circuit Theory) 769 (Electron Device Physical Theory) Math 609 (Fourier Series & Boundary Values)*

855 (3) SOLID STATE ELECTRON DEVICES II. Basic analysis of conduction phenomena in semiconductors, carrier lifetime; theory of p-n junction rectifiers, and junction transistors. *Prereq: 854, concur Physics 727.*

856 (3) SOLID STATE ELECTRON DEVICES III. Design theory of junction diodes, junction transistors, unipolar transistors, four-layer switches, variable capacitance diodes, and parametric amplifiers.

857 (3) QUANTUM ELECTRON DEVICES
Analysis of energy of atomic gases as applied to gas lasers; crystal structure of solid-state maser and laser materials. *Prereq.: 787, 832, Math. 723 and Physics 728, or equiv.*

ELECTRICAL ENGINEERING *(Cont.)*

858 (3) QUANTUM ELECTRON DEVICES
Quantum mechanical and statistical analysis of energy levels in solids and of microwave and optical energy conversions in masers and lasers. *Prereq.: 857.*

859 (3) QUANTUM ELECTRON DEVICES
Theory and design of masers and lasers; current research in quantum electron devices. *Prereq.: 858.*

950 (1-6) RESEARCH IN ELECTRICAL ENGINEERING.
Research for thesis or dissertation purposes only.

ENGINEERING MECHANICS

703 (2) EXPERIMENTAL STRESS ANALYSIS. Experiments with electric strain gages, stress coat, brittle models, and photoelastic analysis of structures; determination of fatigue limits. *Prereq: 602 (Strength of Materials)*

707 (3) MECHANICAL VIBRATIONS.
Acceleration, velocity, and displacement from variable cyclic forces; free and forced vibrations; torsional vibrations; dynamic balance; vibration and whipping of shafts. *Prereq: 607 (Dynamics) and Math 544 (Differential Equations)*

712 (3) ADVANCED STRENGTH OF MATERIALS
Beams on elastic foundations; beam columns; deflection curves by trigonometric series; limitations of superposition. *Prereq.: 602 and/or concur. Math. 609 or 626.*

715 (3) THEORY OF ELASTIC STABILITY
Buckling of bars under axial and lateral loads; effect of curvature and eccentricity; determination of critical loads by energy; tube and beam buckling. *Prereq.: 605 or 606, Math. 544 or 608 or 611.*

717 (3) ADVANCED ENGINEERING DYNAMICS
Three dimensional vector statics; kinematics and kinetics of particles and rigid bodies; energy, momentum, stability; application of Lagrange's equations to machinery, vehicles, balistics; gyroscope. *Prereq.: 607 and Math. 544 or 608 or 611.*

718 (3) THEORY OF DYNAMIC STABILITY
Study of the criteria for dynamic stability. Methods of stabilizing critical mechanical systems. Applications to space mechanics, structures, and vehicles. *Prereq.: 707.*

799 (2-5) SPECIAL PROBLEMS IN ADVANCED ENGINEERING MECHANICS. The student must register for specific problems in the areas indicated below, and may register for more than one at a time. He cannot accumulate more than fifteen credits for entire course. *Prereq: 13 hrs of 600 courses, and permission of Instructor.*

(a) Experimental Stress Analysis
(b) Dynamics
(c) Fluid Mechanics
(e) Applied Elasticity
(f) Strength of Materials
(g) Vibrations
(h) Plasticity
(j) Plates and Shells

ENGINEERING MECHANICS *(Cont.)*

807 (3) VIBRATIONS OF CONTINUOUS MEDIA. Equations of motions for strings, membranes, prismatical bars, and plates for various boundary conditions; approximate methods for complicated shapes; wave propagation in elastic media. *Prereq: 707 and/or concur Math 609 or 626 (Fourier Series)*

808 (3) NON-LINEAR VIBRATIONS
Vibrations of damped and undamped systems with non-linear restoring forces; self-sustained oscillations; application of Hill's equation to stability of non-linear oscillations. *Prereq.: 707 and Math. 607 or equiv.*

813 (3) 814 (3) 815 (3) APPLIED ELASTICITY.
Analysis of stress and strain; laws of elasticity; plane stress and strain for isotropic and anisotropic bodies; complex variable methods; torsion; membrane; stress concentrations; analysis of structural elements. *Prereq: 605 or 606 (Stress Analysis) and/or concur Math 609 (Fourier Series)*

827 (3) RANDOM VIBRATIONS
Description of random processes; statistical properties of the response of mechanical systems; optimization of systems subjected to random inputs; instrumentation. *Prereq.: 807.*

950 RESEARCH IN ENGINEERING MECHANICS.
Research for thesis or dissertation purposes only.

INDUSTRIAL ENGINEERING

706 (3) INDUSTRIAL QUALITY CONTROL.
The application of probability theory, statistics, and control theory to problems in product inspection and process control. Economic evaluation of quality control techniques. *Prereq: 602 (Principles of Engr. Management) and Math 547 (Statistical Methods in Engr.)*

764 (3) PRODUCTION PROGRAMMING. Mathematical formulation and solution of problems of scheduling, inventory control, logistics, etc. The course covers various linear models. *Prereq: 761 (Engr. Economy)*

798 (3-6) ADVANCED STUDIES IN INDUSTRIAL ENGINEERING. The student must register for specific classes in areas as indicated below, and may register for more than one at a time. However, he cannot accumulate more than twenty-four credit hours for the entire course. *Prereq: 5th yr standing and permission of Instructor.*

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

798A	Job Evaluation
798B	Organized Labor and Industrial Methodology
798C	Industrial Applications for Statistics
798D	Quality Control
798E	Engineering Economy
798F	Production Planning and Control
798G	Contemporary Problems in Plant Layout and Design
798H	Materials Handling
798I	Time Standards and Estimates
798J	Human Factors in System Design
798K	Organization of Industrial Engineering Functions
798L	Production Engineering
798M	Industrial Safety Problems

INDUSTRIAL ENGINEERING *(Cont.)*

799 (1-6) SPECIAL PROBLEMS IN INDUSTRIAL ENGINEERING. This course is intended to give the advanced student an opportunity to pursue special studies not offered in fixed curricula. *Prereq: 5th yr standing and permission of instructor.*

842 (3) OPERATIONS RESEARCH I
Introduction to the nature and problems of Operations Research and the study of actual case histories in the field. *Prereq.: Calculus, probability theory and statistical methods, and permission of instructor.*

843 (3) OPERATIONS RESEARCH II
The position of the model in Operations Research and the study of the important techniques and formal approaches to research problems. *Prereq.: 842.*

844 (3) OPERATIONS RESEARCH III
Consideration of topics in Operations Research including research methodology in the various sciences, and the conduct of actual Operations Research investigations. *Prereq.: 843.*

851 (3-6) PERSONNEL RESEARCH IN ENGINEERING INDUSTRIES.
Advanced work on a graduate level in one of the several phases of personnel management in engineering industries. *Prereq: 602 (Principles of Engr. Management) and 604 (Work Measurement & Standards)*

861 (3-6) RESEARCH IN DECISION PROCESSES.
Advanced work in decision theory and processes including criterion research, decision making under uncertainty and in conflict situations, and gaming techniques. *Prereq: 761 (Engr Economy) & 764.*

862 (3) DECISION THEORY.
Introduction to normative decision models and their applications. *Prereq: 706, 761 (Engr. Economy)*

950 (1-6) RESEARCH IN INDUSTRIAL ENGINEERING.
Research for thesis or dissertation purposes only.

MATHEMATICS

542a (3) CALCULUS AND ANALYTIC GEOMETRY
Continuation of 541. Polar coordinates, rotation of axes, vectors, velocity, acceleration, space vectors and three dimensional analytic, geometry, cylindrical and spherical coordinates. Linear systems, matrices, characteristic values. *Prereq.: 1 yr. Calculus.* Not open to students with credit for 537.

543a (3) CALCULUS AND ANALYTIC GEOMETRY
Continuation of 542. Partial derivatives, multiple integrals, infinite series. *Prereq.: 542.* Not open to students with credit for 538.

601 (5) ADVANCED CALCULUS. A rigorous presentation of limits, derivatives, mean value theorems, definite integrals, sequences, and series. *Prereq.: 543a.*

607 (5) INTRODUCTION TO THE THEORY OF FUNCTIONS OF A COMPLEX VARIABLE. Topics discussed include power series expansions, the formula of Cauchy, residues, conformal mappings, and elementary functions in the complex domain. *Prereq: 601.* Not open to students who have credit for 624.

MATHEMATICS *(Cont.)*

611 (5) DIFFERENTIAL EQUATIONS. Equations of first and second orders, linear equations, series solutions, approximate solutions, systems of ordinary equations. Legendre and Bessel equations. *Prereq.: 543a.* Not open to students who have credit for 544 or 608.

641 (5) ELEMENTARY MODERN ALGEBRA. An introduction to abstract algebra with topics from elementary ring, field, and group theories. Special emphasis on ring of integers, congruences, polynominal domains, permutation groups. *Prereq.: 543a.*

661 (5) VECTOR ANALYSIS. The algebra and calculus of vectors with applications to mechanics. Differential operators and integral theorems. Introduction to potential theory. *Prereq: 601.* Not open to students who have credit for 622.

672 (5) 673 (5) MATHEMATICAL STATISTICS. Permutations, combinations, probability. Discrete and continuous distributions. Binomial, Poisson, normal chi-square, t, F distributions. Limit theorems of probability. Testing simple hypotheses. Applications of t tests, chi-square tests, F tests, nonparametric tests. Confidence intervals. Regression analysis. Analysis of variance. *Prereq.: 543a.*

674 (5) THEORY OF PROBABILITY
Discrete probability spaces, random walk, Markov chains, stochastic processes, strong laws of probability. *Prereq.: 672.*

692 (5) NUMERICAL ANALYSIS I.
Basic techniques of numerical analysis; finite differences, interpolation, solution of equations, integration, difference and differential equations. Laboratory use of computers. *Prereq: Engr Mech 590 (Digital Computer Programming) and Math 611 or permission of the Instructor.*

700 (1-5) MINOR PROBLEMS.
Conferences, assigned readings, and reports on minor investigations.

701 (5) 702 (5) INTRODUCTION TO ANALYSIS.
The main objective is to train students to understand and apply the basic ideas and methods of analysis. Topics discussed include points, sets, the real continuum, Riemann integration, interchange of limit processes, sequences, series, and measure. *Prereq: 601.*

721 (5) MATHEMATICAL METHODS IN SCIENCE I
Linear differential equations, solutions about singular points; Fourier series; Sturm-Liouville problems; Bessel functions and Legender polynominals; boundary value problems associated with Laplace's equation. *Prereq.: 607 and 611; or 609, 622 and 624.*

722 (5) MATHEMATICAL METHODS IN SCIENCE II
Introduction to tensor analysis with applications to geometry. Elements of the calculus of variations with applications to physical problems. *Prereq.: 670 or 723 or permission of instructor. 722 may be taken without 721.*

723 (5) MATHEMATICAL METHODS IN SCIENCE III
Theory of determinants and matrices, real quadratic and Hermitian forms, groups and vector spaces, applications to physics and engineering. *Prereq.: 15 hrs. Math. of 600 or 700 level or permission of instructor. 723 may be taken without 721 or 722.*

725 (5) INTEGRAL EQUATIONS AND THEIR APPLICATIONS
Orthogonal functions, linear, integral equations of first and second kinds, relations to ordinary differential equations, Volterra's equation, boundary value problems, practical methods of solution. *Prereq.: 608 or 611 or 544.*

MATHEMATICS *(Cont.)*

726 (5) Eigenvalue Problems
Distribution of eigenvalues, self-adjointness, definiteness, Green's functions, minimal properties, approximation of eigenvalues, eigen-function expansions, Ritz method, iteration method, matrix eigenvalue problems, finite differences. *Prereq.: 608 or 611 or 544.*

727 (5) Applied Operational Calculus
Laplace transformation in real domain, applications in physics and engineering; differential equations; Laplace transformation in complex domain, application to partial differential equations; Fourier transform, applications. *Prereq.: 608 or 611 or 544 and 624 or 607.*

728 (5) Special Functions. Power series developments, asymptotic expansion, gamma functions, cylindrical functions, spherical harmonics, orthogonal polynomials, hypergeometric functions, theta functions, elliptic functions and integrals, numerical techniques. *Prereq: 607 and 611.*

729 (5) Applied Complex Analysis. Basic facts of complex analysis; conformal mapping properties of elementary functions, Schwarz—Christoffel formula: distortion theorems; uniformization; applications to electromagnetic fields, fluid dynamics, heat flow. *Prereq: 607 and 611.*

730 (5) Non-Linear Differential Equations. Existence and uniqueness of solutions; initial conditions; periodic solutions; Kryloff-Bogoljuboff method; graphical and numerical methods; applications to vibrational problems, relaxation theory, and nonlinear mechanics. *Prereq: 611.*

741 (5) 742 (5) Introduction to General Topology. This sequence is designed to give training in the areas of modern geometry, particularly in analytic topology. *Prereq: 701 or permission of Instructor.*

950 (1-6) Research in Mathematics.
Research for thesis or dissertation purposes only.

MECHANICAL ENGINEERING

756 (3) Cryogenic Systems.
Study of low-temperature processes and equipment; physical properties at low-temperatures; practical application of low-temperature techniques and processes in engineering systems. *Prereq: 601 (Thermodynamics) and 610 (Heat Transfer)*

798 (3-5) Advanced Studies in Mechanical Engineering
Advanced topics in the various phases of Mech. E. The particular topics, the number of credit hours, and the instructor will be announced in the quarter previous to the one in which the course is offered. *Prereq.: Permission of instructor.*

801 (3) Advanced Applied Thermodynamics
An analytical study of the thermodynamics of fluid flow. *Prereq.: 601 (Thermodynamics) and Math. 544 (Differential Equations)*

807 (3) 808 (3) Advanced Heat Transfer.
A study of the general heat transfer equations and their application to heat transfer in solids and through fluids. The use of numerical and graphical analysis will be included. *Prereq: 610 (Heat Transfer) and Math 544 (Differential Equations) and Math 609 (Fourier Series & Boundary Value Problems)*

843 (3) Stress Analysis of Machinery.
A study of the concepts, principles, and procedures related to the analysis of stresses and strains in machine parts. *Prereq: 736 (Machine Design) and 861 (Distr. Parameter Systems) or Math 609 (Fourier Series & Boundary Value Problems)*

MECHANICAL ENGINEERING *(Cont.)*

844 (3) KINEMATIC SYNTHESIS AND ANALYSIS.
A study of fundamental methods for the synthesis and analysis of motions in mechanical systems. *Prereq: 615 (Kinematics of Machines) and 736 (Machine Design)*

853 (3) DYNAMICS OF INVISCID FLUIDS.
Three dimensional, compressible, and incompressible inviscid flows, including irrotational and rotational motion with and without flow discontinuities. *Prereq: 609 (Thermodynamics & Fluid Dynamics) and 861 or Math 609 (Fourier Series & Boundary Value Problems) or equiv.* Not open to students with credit for 808 or 850.

854 (5) LAMINAR FLOW AND HEAT TRANSFER
Laminar boundary layers and fluid flow with and without heat transfer, fully established entrance flows, free convection, extensions to compressible flows. *Prereq.: 610 (Heat Transfer) and 853.* Not open to students with credit for 808 or 850.

855 (5) TURBULENT FLOW AND HEAT TRANSFER
Turbulent boundary layers and flows with and without heat transfer for internal and external flows including laminar instability, Reynolds stresses, and mixing length theory. *Prereq.: 854.* Not open to students with credit for 808 and 850.

861 (3) DISTRIBUTED PARAMETER SYSTEMS. Numerical and analytical methods for obtaining solutions to engineering problems in heat transfer, fluid mechanics, and other field problems. *Prereq: 610 (Heat Transfer) and Math 544 (Differential Equations) or equiv.* Not open to students with credit for 807, 808, or 850.

890 (2) MECHANICAL ENGINEERING SEMINAR. All graduate students in Mech E reqd to take this course.
A group study of the frontiers of knowledge in Mech E by assignment of reading in technical literature, student presentations, and related group discussions.

950 (1-6) RESEARCH IN MECHANICAL ENGINEERING.
Research for thesis or dissertation purposes only.

METALLURGICAL ENGINEERING

630 (3) PHYSICAL METALLURGY I. Not open for graduate credit for students majoring in Met E.
States, crystal structure, and properties of single crystals of pure metals. *Prereq: 560 (Introductory Metallography)*

631 (3) PHYSICAL METALLURGY II. Not open for graduate credit for students majoring in Met E.
Polycrystalline aggregates. Alloying of metals and precipitation of second phases. *Prereq: 560 (Introductory Metallography)*

632 (4) PHYSICAL METALLURGY III. Allotropy of pure metals and alloys. Diffusion in metals. Properties of metallic surfaces and surface reactions. *Prereq: 631.* Not open for graduate credit for students majoring in Met E.

703 (4) ADVANCED METALLOGRAPHY. Determination of phase diagrams. Decomposition of austenite and the hardenability of steels. Surface-hardening treatments for steels. Age-hardening alloys. *Prereq: 632.* Not open for graduate credit for students majoring in Met E.

METALLURGICAL ENGINEERING *(Cont.)*

710 (1-6) METALLURGICAL INVESTIGATIONS. The class is divided into groups for investigation along the lines of their special interests as follows: (a) the properties of metals and alloys, (b) production and refining of metals, (c) mineral and coal beneficiation, (d) fuels, (e) metallurgical equilibria, (f) corrosion engineering, (g) foundry, (h) powder metallurgy. All investigations are under the close direction of instructors. Comprehensive report required. *Prereq: permission of the department.* This course may be repeated for a maximum of nine hours credit.

712 (3) METALLURGICAL THERMODYNAMICS
The application of thermodynamics to the study of metallurgical systems. *Prereq.: Chem. 683 (Physical Chem.)*

730 (3) CORROSION. *Prereq: 4th yr standing in engineering.*

735 (3) MECHANICAL METALLURGY
Behavior of metals under simple and combined stress systems. Elements of elastic theory, plastic deformation, dislocation theory, strength theories, and fracture. *Prereq.: 703 and Engr. Mech. 602.*

740 (3) ADVANCED PHYSICAL METALLURGY I
Detailed discussion of nucleation theory, preparation of single crystals, metallic crystals and grains, interpretation of micro-structure in terms of interfacial tensions, grain growth, alloying. *Prereq.: 704 (Physical Met.)*

741 (3) ADVANCED PHYSICAL METALLURGY II
Diffusion in metals. *Prereq.: 704.* Physical Met.

820 (3) QUANTITATIVE DISLOCATION THEORY
Mathematical treatment of dislocation theory and its application to flow and fracture phenomena in solids. *Prereq.: Math. 544 (Differential Eq.) and permission of instructor.*

835 (3) ADVANCED MECHANICAL METALLURGY.
Detailed discussion of elasticity, plasticity, plastic deformation, dislocation theory of plastic flow, and fracture. Effect of state of stress on plastic flow. *Prereq: 735 (Mechanical Metallurgy)*

845 (3) METALLURGICAL THERMODYNAMICS.
Continuation of 844 with major emphasis on practical applications. Numerous problems. *Prereq: 894 (Adv. Metallurgical Thermo)*

950 (1-6) RESEARCH IN METALLURGY.
Research for thesis or dissertation purposes only.

MINERALOGY

950 (1-6) RESEARCH IN MINERALOGY AND PETROGRAPHY.
Research for thesis or dissertation purposes only.

NUCLEAR ENGINEERING

710 (3) APPLIED NUCLEAR ENGINEERING
Industrial and research applications of radioactive isotopes. Thickness and density, food irradiation, direct energy conversion, activation analysis, radioactive tracers, topics of bioengineering. *Prereq.: Physics 614, Math 544 (Differential Equations) and Engineering Mechanics 602 (Strength of Materials.*

NUCLEAR ENGINEERING *(Cont.)*

716 (3) MATERIALS FOR NUCLEAR TECHNOLOGY
The physical metallurgy of reactor materials; the effects of reactor environment on the structure, the physical and mechanical properties of these materials. *Prereq.: Metallurgical Engineering 611 (Elements of Material Science).*

770 (3) PLASMAS AND CONTROLLED FUSION
The thermonuclear problem is analyzed and approaches to a stable and sufficiently hot plasma are evaluated. Nuclear reactions, plasms kinetics, diognostic devices, and engineering problems in research and development and power production are discussed. *Prereq.: Physics 615 Mechanical Engineering 621 (Heat Transfer and Fluid Flow) or Physics 702 or equivalent.*

950 (1-6) RESEARCH
Research for thesis or dissertation purposes only.

PHYSICS

601 (3) INTERMEDIATE PHYSICAL MECHANICS. Analytical treatment of vectors; kinematics and dynamics of particle; force fields; simple harmonic oscillator and modifications; emphasis on analytical methods used in other physics courses. Not open for graduate credit for Physics majors. Reqd: all undergraduate Physics majors.

603 (3) INTERMEDIATE HEAT
Introduction to theory of heat with applications. Not open for graduate credit to Physics majors.

606 (3) INTRODUCTORY PHYSICAL OPTICS
Introduction to diffraction; interference; and polarization phenomena. Applications in design and performance of optical instruments.

608 (3) INTERMEDIATE ELECTRICITY AND MAGNETISM
Intermediate mathematical treatment of electric and magnetic fields; problem solving emphasized. *Prereq.: 601.* Not open for graduate credit to Physics majors.

610 (3) ELECTRON PHYSICS
Physical phenomena and elementary theory of solids; binding and energy bands of solids; electrical, thermal and magnetic properties of metals and semi-conductors. *Prereq.: 601 and 614 or equiv.*

614 (3) INTRODUCTION TO MODERN PHYSICS. Intermediate mathematical treatment, including: fundamental particles; qualitative concepts of quantum theory and their history; emission and absorption processes; atomic and molecular structure. Reqd: all undergraduate Physics majors and Elec E majors. Not open for graduate credit for Physics majors.

615 (3) INTRODUCTION TO NUCLEAR PHYSICS. Properties of the atomic nucleus; disintegration processes; particles and photon emission; fission; fusion. Detection techniques for nuclear radiations. Energy levels and selection rules. *Prereq: 601 and 614 or equiv.* Not open for graduate credit for Physics majors.

648 (3) PHYSICS OF THE UPPER ATMOSPHERE. The structure of the upper atmosphere as obtained from studies of the ionosphere, ozonosphere aurorae, meteors, and use of rockets. *Prereq: 601.*

701 (1-6) MINOR PROBLEMS IN PHYSICS. A course designed to give a properly qualified student opportunity for independent reading, study or lab work in a specialized field of interest. Repeatable. *Prereq: satisfactory advanced courses in experimental and theoretical physics and permission of instructor.*

PHYSICS *(Cont.)*

702 (3) KINETIC THEORY OF GASES
Introduction to kinetic theory of gases with applications to physical systems. *Prereq.: 603, and Math. 601 and 611 or 608 and 609.* Not open to students with credit for 604.

712 (3) FUNDAMENTALS OF ELECTRICITY AND MAGNETISM.
Mathematical theory of classical electricity and magnetism. *Prereq: 601, 608 and Math 661.*

713 (3) ELECTROMAGNETIC FIELD PHENOMENA.
An introductory course in Maxwell's theory of the electromagnetic field. *Prereq.: 601, 712 and Math 611.*

716 (3) INTRODUCTION TO THEORY OF SOLIDS
Fundamental properties of solids with emphasis on conduction in metals and semiconductors. *Prereq.: 610.*

718 (3) MODERN ATOMIC SPECTROSCOPY.
Modern theory of structure of the atom and quantum-mechanical treatment of origin of atomic spectra. *Prereq.: 601, 614.*

719 (3) SPECTRA AND STRUCTURE OF MOLECULES. Experimental methods and theory of molecular spectra; relation of spectra to molecular structure. *Prereq: 601, 614.*

720 (3) X-RAY PHYSICS
Modern theory and experiment in X-ray emission, absorption, scattering, dispersion; application to solid state and nuclear physics. *Prereq.: 718.*

721 (3) FUNDAMENTALS OF NUCLEAR PHYSICS
Topics in nuclear research; beta decay, shell structure, internal conversion, resonance, scattering, elementary particles, angular correlation, collision dynamics. Concurrent course in quantum mechanics recommended. *Prereq.: 718.*

733 (3) NUCLEONIC MEASUREMENT AND INSTRUMENTATION
Nuclear measurements from the latest types of nuclear instruments; characteristic radiations of numerous radioactive sources. The neutron experiments center around a subcritical reactor. *Prereq.: 615 and permission of instructor.* Not open to students with credit for 633. Repeatable to a maximum of 6 cr. hrs.

740 (3) 741 (3) 742 (3) INTRODUCTION TO THEORETICAL PHYSICS.
Fundamentals of classical mechanics including transformation of reference frames; dynamics of particles and collections; rigid rotators; Hamilton's principle; Lagrange's equations; vibration theory; special relativity; elasticity; fluid dynamics; wave motion.

950 (1-6) RESEARCH IN PHYSICS.
Research for thesis or dissertation purposes only.

PHYSIOLOGY

950 (1-6) RESEARCH IN PHYSIOLOGY.
Research for thesis or dissertation purposes only.

PREVENTIVE MEDICINE

780 (3-5) Minor Problems. *Prereq: adequate preclinical training and satisfactory scholarship in regular required work, and permission of chairman of department.*

950 (1-6) Research in Preventive Medicine.
Research for thesis purposes only.

PSYCHOLOGY

605 (3) Physiological Psychology
Some physiological correlates of psychological phenomena. The properties of integrated organ systems, with emphasis upon the characteristics of their elements. Psychosomatic abnormalities will be considered. *Prereq.: 402 or 403 (General Psychology)*

606 (3) Advanced Physiological Psychology
Further physiological correlates of psychological phenomena. Sensory and motor processes will be special topics. *Prereq.: 605.*

608 (4) Elementary Statistical Methods. Introduction to statistics and application to psychological and educational research. Rationale, computation, and interpretation. *Prereq: 601.*

623 (3) Engineering Psychology. Application of methods and techniques from experimental psychology to problems of equipment design for human use; the design, operation and management of man-machine systems. *Prereq: 504 (Sensation and Perception) and 508 (Quantitative Methods in Psych.) or equiv, plus 15 qtr hrs in Psych or 5 qtr hrs in Psych plus 9 qtr hrs in engineering courses on time and motion study, quality control, or machine design.*

627 (3) Performance Theory. Human information processing in the continuous and in the discrete cases. Decision theory and servo-theory as applied to the human operator of complex man-machine systems. *Prereq: permission of the instructor.*

650 (1-6) Minor Problems. Investigation of minor problems in the various fields of psychology. By permission of the chairman of the department and the Director of the Bureau of Educational Research and Service, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff. *Prereq: 16 qtr hrs Psych and permission of instructor.*

687 (3) Psychology of Vision
Phenomena, methods, and theory in all areas of current visual research; provides a foundation in sensory psychology as exemplified in vision. *Prereq.: 504 (Motivation and Action) or permission of instructor.*

950 (1-6) Research in Psychology.
Research for thesis or dissertation purposes only.

ACADEMIC CALENDAR, 1965-1966

FALL TRIMESTER

August 16, Monday	Fall registration begins (by appointment)
August 30, Monday	Fall registration for the Academic Center (evening classes) and for the daytime classes.
September 7, Tuesday	Classes begin at 8:00 a.m. Last day for full-time students to pay fees without penalty.
September 9, Thursday	Last day for part-time students to pay fees.
September 25, Saturday	Last day when an upperclassman may drop a class without grade.
October 23, Saturday	Last day when a freshman may drop a course without grade.
November 8, Monday	Pre-registration for Winter Trimester begins.
November 25, Thursday	Thanksgiving Day (no classes)
November 29, Monday	Pre-registration for Winter Trimester begins.
December 13, Monday	Final examinations begin. New student registration for Winter Trimester begins.
December 18, Saturday	Fall Trimester ends.

WINTER TRIMESTER

January 3, Monday	Classes begin at 8:00 a.m. Last day for full-time students to pay fees without penalty.
January 6, Thursday	Last day for part-time students to pay fees.
January 22, Saturday	Last day when an upperclassman may drop a course without grade.
February 19, Saturday	Last day when a freshman may drop a course without grade.
March 7, Monday	Pre-registration for the Spring and Summer Terms and for the Fall Trimester, 1966-67.
March 28, Monday	Pre-registration for the Spring and Summer Terms and for the Fall Trimester, 1965-66.
April 11, Monday	Final examinations begin. New student registration for the Spring and Summer Terms begins.
April 17, Saturday	Winter Trimester ends.

THIRD TRIMESTER (Spring Term)

April 25, Monday	Spring registration for students who have not pre-registered.
April 26, Tuesday	Classes begin at 8:00 a.m. Last day for payment of fees without penalty.
May 13, Friday	Last day to drop a course without grade.
June 13, Monday	Pre-registration begins for the Summer Term and for the Fall Trimester. (Fall registration at this time is limited to students attending the Spring Term.)
June 16, Thursday	Spring Term ends.

THIRD TRIMESTER (Summer Term)

June 20, Monday	Summer registration for students who have not pre-registered.
June 21, Tuesday	Classes begin at 8:00 a.m. Last day for payment of fees without penalty.
July 8, Friday	Last day to drop a course without grade.
August 8, Monday	Pre-registration begins for the Fall Trimester for students attending the Summer Term.
August 11, Thursday	Summer Term ends.