Ohio Northern University Bulletin

1966/67 CATALOG
MEMORANDUM

The Department of Economics & Business Administration

Date: June 8, 1966

To: Mr. Smerling - Registrar

Subject: Change in course number.

Change the course number 421 International Economics to 385 to complete the sequence 383, 384, 385.

383 Intermediate Economics
384 Macroeconomics
385 International Economics

Please notify.

Very truly yours,

William D. Humphrey

[Signature]
THE GEORGE FRANKLIN AND SARAH CATHERINE GETTY

College Of Liberal Arts

OSCAR G. DARLINGTON, Dean

DIVISIONS AND DEPARTMENTS

HUMANITIES: Department of Art; English, Speech and Theatre; Foreign Languages; Music; Philosophy and Religion.

NATURAL SCIENCES: Biology, Chemistry, Mathematics, Physics.

SOCIAL SCIENCES: Economics and Business Administration; History and Political Science; Psychology and Sociology.

TEACHER EDUCATION: Elementary and Secondary Education; Industrial Arts Education; Physical Education; Music Education; Art Education.

OBJECTIVES

The objectives of the College of Liberal Arts are: to develop in each student a love of learning and a reasonable competence in some significant area of knowledge; to help him evolve a mature philosophy which gives meaning to life, apart from its material accomplishments; to cultivate comprehensiveness of thought; to share in the intellectual and cultural achievements of mankind; to encourage critical thinking, continued reflection and re-examination of basic ideas and values; to develop skill in finding information and in evaluating such information so as to distinguish fact from opinion; to clarify knowledge by research and by re-interpretation of the old in the light of the new.

A well-rounded liberal education with stress on moral and spiritual values is designed to develop in the student poise and perspective with which to meet and evaluate life situations; to fit him for responsible citizenship; to give him a scholarly foundation for further study or professional training; and to afford him a rich and full personal life.
ADMISSIONS STANDARDS

In addition to the general requirements for admission to the University stated in this catalog, the College of Liberal Arts accepts graduates of high school and non-graduates with sixteen acceptable units of high quality work who are recommended by the high school principal. Twelve of these units shall be in any combination of the following subjects: English (four years), languages, history, two units in mathematics (including algebra and plane geometry), and natural science. Priority is given to applicants with an Ohio "State Board Course in Basic Studies" certificate. Deficiencies in entrance requirements may be made up to the extent of two units, preferably during the prior summer or during the first quarter of the freshman year, or from other agencies approved by the University.

Acceptable scores on the College Entrance Examination Board tests, or their equivalent, are expected of all incoming students.

Students expecting to go to college are encouraged to take two units of Latin and/or a modern foreign language while in high school.

High school seniors whose ability and maturity warrant may, upon recommendation of the high school principal and with the approval of the Admissions Committee, take a limited amount of college work for credit either on campus or in the Evening Division during their senior year.

Students from other accredited colleges and universities in good academic standing and entitled to honorable dismissal may be admitted with advanced standing. Concealment of previous college attendance is cause for revocation of admission.

THE DEGREE OF BACHELOR OF ARTS

General and Advanced Courses. The first two years are usually devoted to general education, presenting the courses which will furnish the foundation and background for advanced education. Work in the major field is taken largely on the advanced level, together with advanced electives.

Prescribed. Courses prescribed in the program of general education include one year of English Composition; a quarter of Speech; eighteen hours in two of the social sciences; Historical Study of Philosophy and Religion (or a one-year course in philosophy or religion, upon approval); six quarters in two of the natural sciences, including Math. 111, 112 and 113, but excluding Chemistry 105 and Physics 210; one full year of advanced work in English or American Literature; two quarters in art, music, theatre, or a foreign language culture course; and two years of one foreign language or their equivalent.
The Major Field. The candidate for a degree must complete in a logical sequence a major of not less than forty-five quarter hours nor more than sixty (excess hours permitted in music). The faculty adviser will assist the student in planning this major not later than the last quarter of the second year. Candidates for the degree of Bachelor of Arts who expect to teach in the public school should satisfy professional education requirements and will have a member of the Department of Education for a professional adviser. If teacher certification requires more than sixty quarter hours in the major field, they must be in excess of the total hours required for graduation.

The following major fields are offered toward the Bachelor of Arts degree in the College of Liberal Arts:

- Art
- Biology
- Chemistry
- Economics and Business Administration
- English, Speech, and Theatre
- Foreign Language
- History
- Mathematics
- Music
- Philosophy and Religion
- Physics
- Political Science
- Psychology
- Sociology

THE DEGREE OF BACHELOR OF SCIENCE

The curriculum for the degree of Bachelor of Science is designed for students preparing for graduate study in the natural sciences or for industrial positions. The major may be in biology, chemistry, mathematics or physics, and the Declaration of Major card must be approved by the end of the sophomore year. The candidate for this degree shall complete the courses prescribed for the degree of Bachelor of Arts with a minimum of 80 quarter hours in the Division of Natural Sciences.

THE DEGREE OF BACHELOR OF SCIENCE IN EDUCATION

The prescribed general education courses for the Bachelor of Science in Education degree are: English Composition 151, 152, and 153; one three hour course in Speech; 18 hours of Social Science courses from two different Social Science fields, other than Psychology; one year of English or American Literature; two quarters in two areas of fine or applied arts; Philosophy and Religion 231-232 and 233, or nine hours in the Department of Philosophy and Religion; and a
minimum of 21 hours of Natural Science, including Mathematics 111, 112 and 113, or equivalent mathematics courses.

Students majoring in the following fields will be granted the degree of Bachelor of Science in Education upon completion of the requirements: Elementary Education, Art Education, Health and Physical Education, Industrial Arts Education, Music Education, Science Comprehensive and Social Studies Comprehensive.

A student may enroll in the Teacher Education program during his freshman or sophomore years. To be admitted as a candidate for the degree, Bachelor of Science in Education, formal application must be made by the end of the sophomore year. The student must maintain a 2.25 accumulative quality point average, and have completed 75% of prescribed freshman and sophomore course work. The above regulation also applies to students working toward the degree of Bachelor of Arts and teacher certification.

All students preparing to teach at either the elementary or secondary level must have their programs approved by the Chairman of the Division of Teacher Education. Those students preparing to teach at the secondary level must meet the requirement for a major under the direction of the appropriate department chairman.

A grade of "C" or better is required in all Professional Education courses and in all courses in the major field. Students with degrees from other accredited institutions may qualify for teacher certification in the Department of Education by completing the required professional courses.

The Department of Education permits the completion of degree requirements and/or recommendation for teacher certification only when a student demonstrates such traits as are deemed necessary for competence in teaching.

PRE-PHARMACY

The first two years of the five-year program leading to the degree of Bachelor of Pharmacy are taken in the College of Liberal Arts. See Pharmacy Section of this catalog.

COMBINATION CURRICULA

ARTS-ENGINEERING (Five-year, Two-Degree Program)

The Arts-Engineering Program, a five-year curriculum, was introduced in 1964 for the superior student challenged by the rewards of understanding more fully both human society and current technology. The student enrolls simultane-
ously in the Colleges of Liberal Arts and Engineering, pays at the Engineering College rate, and receives an appropriate degree in each college upon graduation. To enter this program a first-year student must be prepared to take advanced mathematics. Transfer students in this program must be in residence at Ohio Northern the last three years before graduation. Each student has an adviser in each college. The curriculum outline is given in the engineering section of this catalog.

PRE-PROFESSIONAL CURRICULA LEADING TO THE BACHELOR OF ARTS DEGREE

PRE-MEDICAL SCIENCE CURRICULA LEADING TO THE BACHELOR OF ARTS DEGREE

A medical science committee has been established to advise and aid students in obtaining the undergraduate background in the Liberal Arts and sciences necessary for the study of medical sciences. The committee serves as the professional adviser to students along with a departmental adviser after a major has been chosen. Students may major in a department of their choice keeping in mind that in addition to University and Liberal Arts College requirements, every student in the medical science area must have a knowledge of the basic sciences. For further information and examples of the basic programs write to the Medical Sciences Committee, College of Liberal Arts. This committee consists of the Chairmen of the Departments of Biology and Chemistry and a faculty member representing the non-science areas.

Pre-Medicine. These students meet regularly with the medical science committee for counsel concerning preparation for the study of medicine. It is recommended that the student preparing for professional training in medicine plan to complete four years of undergraduate study.

Pre-Dentistry, Arts-Medical Technology, Arts-Nursing. These students meet with the medical sciences committee for counsel concerning preparation for the respective areas of professional study. In order to receive a Bachelor's degree from Ohio Northern University most students will need to complete four years of undergraduate study.

Depending on the department major a student may be permitted to apply up to 27 quarter hours (33 quarter hours for pre-med techs and pre-nurses) earned at the professional school toward the departmental major requirements and electives at Ohio Northern University.
RELIGIOUS EDUCATION

Professional education beyond the baccalaureate level now is expected of the full-time religious education worker. Ohio Northern offers an A.B. program preparatory to pursuing the Master of Religious Education (M.R.E.) or the Bachelor of Divinity (B.D.) degree with a major in religious education or a doctoral degree in Religious Education. For those interested in preparing for temporary or part-time work in religious education, Ohio Northern offers a major in the Department of Philosophy and Religion with appropriate technique courses taken in the Department of Education.

The one-quarter course in Religious Education described among courses of the department of Education, is required in addition to the field of concentration for persons looking forward to professional study in the field of religious education.

PRE-THEOLOGY

The recommendations of the American Association of Theological Schools are followed in counseling the pre-theological student in planning his program leading to the A.B. degree. An interdisciplinary major in the Department of Philosophy and Religion, or a major in another appropriate department may be selected. In general, a broad, liberal course enables the student to appreciate his graduate studies to the fullest extent. Emphasis throughout this program is upon Christian idealism designed to develop spiritually-minded persons well-equipped for serious dedication to the Christian ministry.

PRE-LAW

In general, law colleges advise a broad liberal undergraduate preparation. A pre-law faculty adviser assists the student in the selection of courses.

FOREIGN AND PUBLIC SERVICE

The demand for well-prepared officials in the United States Foreign Service and in the Public Service of the federal and state government is at a high peak. To prepare for work in these fields a student should plan to continue with graduate education after receiving his degree of Bachelor of Arts. The University offers an inter-departmental concentration in International Relations and a departmental concentration in political science and foreign languages to prepare students for the Foreign Service and for Public Service. The Dean of the College of Liberal Arts should be consulted for the curricula outline in these fields.
GENERAL REGULATIONS

1. The student may not register for more than seventeen hours of academic work unless he has received a grade of "B" or better in the preceding quarter, in which case the Dean may grant permission for extra hours. A normal program consists of twelve to seventeen scheduled hours including physical education.

2. All new students in the College of Liberal Arts are required to take one quarter of Freshman Orientation, normally offered in the fall quarter.

3. The student indicates his choice of a major field by filling out a Declaration of Major card available in the office of the Dean of the college or the Registrar, and secures the signature of the department chairman. The completed card indicates that the department accepts a student as a major. To change from one department to another, the student shall complete a Change of Major card, also obtainable as indicated above. A student is officially accepted as a major in a department only when he has completed the above procedure.

4. No course for which the student has received a "D" is acceptable toward a major field.

5. Seniors taking courses in the "100" series in other than foreign languages or mathematics must complete additional work of a high quality for full credit. Seniors selecting "100" courses should consult the Dean of the college.

6. Juniors and seniors are required to schedule a majority of their courses from the "300" and "400" group.

7. Application for senior rating and graduation should be made to the Registrar during the third quarter of the junior year.

CLASSIFICATION OF STUDENTS

For purpose of classification the minimum requirements for sophomore standing are thirty-eight quarter hours of academic work; for junior standing, eighty-four hours with all freshman and sophomore requirements completed; for senior standing, 130 credit hours and the satisfactory completion of the English Proficiency Examination.

WARNING AND PROBATION

A quality point average of 2.0 is necessary for graduation.

If a student's quality point average for any quarter falls below 2.0, the student will be placed on warning.
If a student on warning receives a quality point average for the following or any subsequent quarter lower than that stipulated for satisfactory standing, he will be placed on probation and his participation in extra-curricular activities shall be reviewed by his adviser, the Dean of Students and the Dean of his College. If his quarter average rises to the required level but his accumulative average is still below the required level, he will be continued on probation.

Any student with an unusually low quality point average for any quarter may be placed directly on probation or strict probation by the Dean of the College even though he has not been on warning in the previous quarter.

A student on probation whose average for the following quarter is below the required minimum for that quarter and whose accumulative average is also below the minimum may be recommended by the Scholarship Committee of the College to the dean for suspension or dismissal.

Students may at any time also be placed on strict probation. These students must report in person every two weeks to the Office of the Dean of the College until the end of the quarter at which time they go on good standing or are recommended for dismissal. Such students cannot participate in extra-curricular activities without the approval of the dean of the college.

SENIOR COMPREHENSIVE EXAMINATION

To assist each student to integrate his knowledge in his major field, and to test the overall quality and maturity of his work, a comprehensive examination, written or oral, or both, covering the work in his major department shall be required during the winter or spring quarter of his senior year. He shall be examined by a committee of the faculty appointed by the Dean of the College in consultation with the department chairman. The committee shall include one member of the faculty outside the division of the student's major interest.

Notation of success, but not failure, in "passing" or "passing with distinction" the senior comprehensive examination will be made on the official transcript of the student specifying the field in which it was given. The department chairman reviews with the student soon after this examination the strengths and weaknesses it revealed.

GRADUATION

To graduate with the Bachelor's degree, a student must complete a minimum of 180 quarter hours of academic work plus six hours of physical education, with an accumulative qualitative point average of at least 2.0.
A residence period of the last three quarters and the completion of at least forty-five quarter hours, with at least ninety quality points, elected largely from "300" and "400" courses in the College of Liberal Arts of this University are minimum requirements for a student admitted on advanced standing.

THE DEPARTMENTAL COURSES
ART

(Department 111)
Associate Professor West (Chairman), Mr. Grimes, Mr. Mitchell

The department seeks to develop within the student an understanding of the fine arts, to foster within the University an awareness of art as an essential ingredient of an educated person, and to provide the opportunity for the student to develop proficiency in various art media.

The artist should be educated comprehensively through a program combining professional training and broad study in the liberal arts.

The student majoring in art: (1) Receives as broad an understanding of art as is possible; (2) becomes acquainted with historical and cultural knowledge of the past and present; (3) develops a working proficiency through mastery of the tools and skills of his profession; and (4) develops personal modes of expression in the media of the visual arts.

Students desiring to teach art in public schools are advised to take at least 10 extra hours in painting, drawing, ceramics, sculpture, or crafts. Requirements for special certification in Art Education are described under Teacher Education in this catalog.

The Department of Art retains for its collection one completed work from each course taken for credit within this department. A comprehensive examination in art and a public exhibition of the student's studio work is prerequisite for graduation with a major in art.

101, 102. Art for Elementary Teachers. Designed for prospective elementary classroom teachers with emphasis on theory, materials, techniques. Lecture and lab. 101 prerequisite for 102. 6 hours.

111, 112, 113. Drawing and Design. Theories and techniques of drawing in various media, including plastic elements in two and three dimensions. Lab. Required of all Art Majors. 9 hours.

121, 122, 123. Studio Concepts. Application of drawing and design concepts to specific studio discipline in painting and sculpture. A coordinate course to 111, 112, 113. Lab. 6 hours.
140. ART HISTORY SURVEY. An historical survey of style in painting, sculpture, and architecture from pre-historic time to the present. Illustrated lecture. 3 hours.

200. INTRODUCTION TO ART. A survey of the visual arts. Emphasis upon aesthetic theory, appreciation, and judgment. Illustrated lecture. Fulfills Liberal Arts requirement. 3 hours.

210. FIGURE DRAWING. Design, structure, and anatomy of the human figure. May repeat for credit once. Prerequisites: 111, 113. 3 hours.

221. JEWELRY. Use of a variety of materials in the making of jewelry. Emphasis on design and the development of skill in manipulation of tools and materials. May repeat for credit once. 3 hours.

222. LETTERING. Selected elements, styles, principles, media, and techniques of lettering. May repeat once for credit. Lab. Prerequisite: 113 or permission of instructor. 3 hours.

231, 232, 233. PAINTING. Emphasis on painting in oil. Individual instruction. Lab. Prerequisite: 113, 123 or permission of instructor. 3 hours.

310. ADVANCED FIGURE STUDY. Drawing, painting, and sculpting from the live model. Prerequisite: 3 hrs. Art 210. May be repeated to 9 hrs. of credit. 3 hours.

321, 322, 323. CERAMICS. The methods of forming, decorating, and glazing clay bodies; coil; slab; wheel thrown; and cast. By permission of instructor. 9 hours.

331, 332, 333. PAINTING. The experimental attitude is encouraged to aid the student in finding his personal means of self-expression. Prerequisite 233. Lab. 9 hours.

341, 342, 343. SCULPTURE. Sculpturing in various media in a variety of techniques. Prerequisite: 15 hours in Departmental courses, permission. 9 hours.

399. ART EDUCATION. Laboratory-seminar for teachers not majoring in art. Techniques, materials, sources. May repeat to total of 6 hours. Permission of instructor. 3 hours.

401, 402, 403. PRINTMAKING. 401: Relief processes (woodcut, etc.). 402: Planographic processes (lithography and silkscreen). 403: Intaglio processes (etching, etc.). Permission of instructor.

410. ADVANCED CERAMICS.
Prerequisite: 321, 322, permission of instructor. May repeat to a total of 9 hours. 1-3 hours.
420. **Advanced Painting.**
Prerequisite: 12 hours of painting (any series), and permission of instructor. May repeat to total 9 hours. **1-3 hours.**

440. **Art Problem.** (Senior Art Majors only.) Independent study in an approved area of the visual arts. May be repeated to total of 9 hours in any of the following areas: 440.07, Art History; 440.03, Ceramics; 440.09, Jewelry or other craft; 440.16, Painting & Graphics; 440.19, Sculpture. **1-3 hours.**

450. **Ancient and Medieval.** Study of art from pre-historic era to the 14th century. Illustrated lectures. No prerequisite. **3 hours.**

460. **Renaissance and Baroque.** Illustrated lectures on the art of the 15th, 16th and 17th centuries in Italy and Northern Europe. **3 hours.**

470. **Impressionism and Post Impressionism.** Emphasis on developments in French Art between the Revolution of 1848 and 1900. **3 hours.**

480. **Contemporary Trends.** Illustrated lecture concerned with the appearance and development of basic artistic expressions from the beginning of the 20th century to the present. **3 hours.**

490. **Senior Review.** Preparation for, and evaluation of, the comprehensive examination and the senior exhibit required of all art major for graduation. Permission, senior status. **1 hour.**

**Biology**

(Department 121)

Professors Bowden, (Chairman), Chester, Meyer; Associate Professor Butler; Assistant Professors Dawson, Gidwani, Hoch, Snyder, Tipple; Miss Emery, Mr. Hollis.

The objective of the department is to develop in each student an understanding of the living world and more integrated concepts common to all biological studies. Adequate preparation is available for graduate or professional studies such as medicine, dentistry, nursing, teaching and other areas of applied biology. The study of biology should enable a student to have a better perspective in the study of governmental, social and economic problems and to have a keener appreciation of the humanities and the arts.

Students majoring in biology complete a minimum of 48 hours in the department, including courses 111, 112, 113, 201, 202, 223, (301, 302, 303) or (331, 332, 333) 402, 440, 450, 423, or 430 or 433 and a comprehensive examination in Biology. In addition, students majoring in Biology complete at least one year of mathematics, one year of chemistry, one year of physics and the second year of
a foreign language. Courses in statistics, psychology, sociology and a second year of chemistry are recommended.

111-112-113. General Biology. A study of biological principles and concepts manifested in plant and animal life with emphasis on their application to man. Discussion in the presence of laboratory materials, 5 hours. 12 hours.

Alternate 111-112-113. General Biology. Independent Study Program. A freshman or sophomore with approval, upperclassmen at their option, may receive credit for General Biology by completing an independent study program under departmental supervision. Consult the chairman. 12 hours.

201, 202. Botany. A study of advanced concepts and principles concerning plant life; structure, function, general classification, life cycles, and environmental relationships. Discussion in the presence of laboratory materials, 5 hours. Prerequisite: General Biology 111-113, or permission of department. 8 hours.

213. Local Flora. A systematic study of vascular plants, both native and introduced. A field course supplemented by greenhouse and herbarium studies. Lecture and class work, 1 hour; laboratory, 6 hours. Permission of department. 3 hours.

223. Invertebrate Zoology. A systematic study of the invertebrate phyla. Discussion in the presence of laboratory materials, 5 hours. Prerequisite: General Biology 111-113, or permission of department. 4 hours.


301, 302, 303. Vertebrate Anatomy and Embryology. Biological principles involved in the embryonic development, the structural changes and the resulting functional modifications of the vertebrates. Lecture, discussion, laboratory, 8 hours. Prerequisite: General Biology 111-113 or permission of department. 12 hours.

331-332-333. Physiology. A structural and functional approach to the human body. Laboratory sessions are held in the Julius and Fannie Rogoff Laboratory of Physiology. The laboratory applies physiological principles at the cellular, tissue and organ level. Lecture, discussion, laboratory, 6 hours. Prerequisite: General Biology 111-113, General Chemistry 131-133. 12 hours.

402. Laboratory Technique. Principles and procedures used in the preparation and instrumentation for biological studies. Lecture and laboratory 7 to 9 hours per week. Open to seniors majoring in Biology. 3 hours.
423. ECOLOGY. Living organisms as dependent and contributing members of an integrated community in a living and non-living environment. Prerequisite: Botany 202, Invertebrate Zoology 223, or permission of department. 3 hours. Alternate years.

430. GENETICS. A study of the principles of genetics as exemplified by higher plants and animals and microorganisms. Included are: Mendelian, biochemical, physiological and population genetics. Lecture, discussion, laboratory 6 hours. Prerequisite: General Biology 111-113, Chemistry 133, Math 113 or Math. 151. 4 hours.

433. ORGANIC EVOLUTION. The development of the organic world, the evidences of evolution and its theories. Prerequisite: General Biology 111-113, and permission of department. 3 hours. Alternate years. Not offered in 1966-67.

440. BIOLOGICAL PROBLEMS. Minor investigations for qualified juniors and seniors who are majoring in Biology. By arrangement, any quarter. 1-3 hours.

450. SEMINAR. Readings, discussions and reports on problems of historical and current interest in Biology. Required of all seniors majoring in Biology. 1 hour.

CHEMISTRY

(DEPARTMENT 122)

PROFESSORS BETTINGER (Chairman), WILHELM; ASSISTANT PROFESSORS ERBENDING, GOODRICH, MCCLURE; MR. HAWBEEKER (on leave), MR. SUTLIFF.

The objective of this department is to help serve the modern cultural need for an understanding of science, to provide the basic preparation in chemistry for those who wish to enter the chemical industry, the teaching profession or pursue graduate study in chemistry, and to serve those who need an understanding of the fundamentals of this physical science as a prerequisite to professional study.

MAJOR IN CHEMISTRY

Two programs are available. One leads to the Bachelor of Science degree and is designed primarily for those who intend to pursue graduate study or terminate their formal education at the Bachelor’s level, to enter the chemical profession.

The Bachelor of Arts program is designed primarily for those who wish a chemistry major in preparation for medicine, secondary school teaching, or any other field which requires background in chemistry.
All chemistry majors fulfill basic university and College of Liberal Arts requirements, take two years of German and Chemistry 131-132-143, 241-242-243, 321, 341-342-343.

In addition, for the Bachelor of Arts degree, two to five hours of chemistry are required to fulfill the forty-six hour minimum for a departmental major.

In addition, for the Bachelor of Science degree, Chemistry 363 (or 373), 451, 462, and three to five hours of advanced courses chosen from chemistry, physics or mathematics are required.

An outline of the basic curriculum for a chemistry major is available from the department chairman.

105. THE SCIENCE OF CHEMISTRY. The structure of matter and chemical consequences. Designed for students preparing for elementary public school teaching. 3 hours.

(No credit given toward B.A. or B.S. degree)

131, 132, 133 or 143. GENERAL CHEMISTRY. Chemistry 131 and 132 include basic principles, use of modern theory and periodic relationships to explain descriptive chemistry. Chemistry 133 is for the student who terminates his study of chemistry with one year, and includes selected topics from organic chemistry. Chemistry 143 is prerequisite for advanced courses in chemistry. Chemical equilibrium, principles of quantitative analysis and the chemistry of the transition elements. The laboratory for general chemistry illustrates principles, basic quantitative techniques and methods of separation of ions in aqueous solutions. Chemistry 131-132-133, three hours of lecture and one three-hour recitation-laboratory period per week. Chemistry 143, three hours of lecture and two three-hour recitation-laboratory periods per week. Prerequisite: Mathematics 111-112-113 or concurrent enrollment in Mathematics 151. 12-13 hours.

161-162-163. HONORS IN GENERAL CHEMISTRY. Extension of introductory chemistry into areas not covered in Chemistry 131-132-133 or 143. Enrollment in this course is by invitation of the chairman. 3 hours.

231-232-233. ORGANIC CHEMISTRY. Organic compounds introducing the modern approach to bonding, structure, and mechanisms of reaction. Three hours of lecture and one three-hour laboratory per week. Prerequisite: Chemistry 143. 12 hours.

241-242-243. ORGANIC CHEMISTRY FOR MAJORS. The same lecture as Chemistry 231-232-233 with separate laboratory emphasizing the synthesis, separation and qualitative identification of organic compounds. Three hours of lecture and two three-hour laboratory periods per week. Prerequisite: Chemistry major and Chemistry 143. 15 hours.
321. Intermediate Chemistry. Emphasis is placed on selected aspects of inorganic and analytical chemistry. Two lectures and two three-hour laboratory periods per week. Prerequisite: Chemistry 143 and Chemistry 233 or 243. 4 hours. 341-342-343. Physical Chemistry. A fundamental course emphasizing thermodynamics, kinetics, quantum theory, and structure of matter. Three hours of lecture and one three hour laboratory per week. Prerequisite: Chemistry 233 or 243, Physics 231, 232, 233 and Mathematics 253. C or better is required in prerequisite courses. Corequisite: Chemistry 321. 12 hours.

363. Advanced Organic Chemistry. An advanced course discussing modern bonding concepts, mechanisms of organic reactions, and interpretation of spectral data. Four hours of lecture and one four-hour laboratory per week. Corequisite: Chemistry 343. 5 hours.

373. Junior Research. Approval of chairman required. Corequisite: Chemistry 343. 2 hours.

451. Advanced Inorganic Chemistry. Chemical principles and bonding theory applied to the study of inorganic systems. The laboratory stresses correlation of theory, reaction chemistry and techniques used in synthesis. Four hours of lectures and one four-hour laboratory per week. Prerequisite: Chemistry 343. 5 hours.

462. Advanced Analytical Chemistry. The theory and application of instrumental analysis. Four hours of lectures and one four-hour laboratory per week. Prerequisite: Chemistry 343. 5 hours.

473. Advanced Physical Chemistry. Four hours of lectures per week. Prerequisite: Chemistry 343. 4 hours.

481-482-483. Senior Research. Approval of chairman required. Prerequisite: Chemistry 343. Corequisite: Chemistry 451 and Chemistry 462. 6 hours.

ECONOMICS AND BUSINESS ADMINISTRATION

(Department 131)
Professor Conklin (Chairman); Associate Professors Cooley, Humphrey; Assistant Professor Carlson; Mr. Young, Mr. Rassoul, Mrs. DaPore, and Special Lecturers.

This department seeks to develop a basic understanding of the theories and principles of Economics and Business Administration as they apply to our modern economic system and the organization and management of modern business enterprise.
The student entering this department has a choice of two major fields, Economics and Business Administration. Within the field of Economics are two areas of concentration, Economics and Finance. In the field of Business Administration, there are five areas of concentration: Accounting, Management, Industrial Management, Marketing and Personnel Management. Detailed curricula in these areas are available from the department chairman.

DEPARTMENTAL REQUIREMENTS

A major must include the following:

- Economics (Accounting) 131, 132, 133
- Economics 201, 202, 203
- Business Law 322
- Money and Banking 352, 353

181, 182, 183. MATHEMATICS OF FINANCE STATISTICS. These required courses are taken in the Mathematics Department but do not count toward the 45 hours required for a major. A student may be excused from Math 181 if he has Math 151 or a year of Fundamental Math. All students majoring in the department are required to take two years of foreign language or an examination by the Department of Foreign Language. Seniors should take Economics 440 in preparation for the Comprehensive Examination.

131-132-133. PRINCIPLES OF ACCOUNTING. Fundamental process of accounting applied to service, trading and manufacturing concerns; preparation of working papers and financial statements. 9 hours.

201-202-203. PRINCIPLES OF ECONOMICS. An analytic description of our economic system; the price system, money and banking and the economy of producers and consumers; income and employment, current economic problems. 9 hours.

213. BUSINESS ORGANIZATION. A study of the various types of business and industrial organizations, recent trends in management, and methods required for administrative, managerial and industrial control. 3 hours.

301. INTERMEDIATE ACCOUNTING. Accounting theories with problem illustrations and applications. Classification of accounts, balance sheet forms, bonds and sinking funds, amortization, partnerships, and insurance. Prerequisite: Accounting 133. 5 hours.

312. COST ACCOUNTING. Accounting for manufacturing enterprises with emphasis on job order process and standard cost accounting. Prerequisite: Intermediate Accounting 301. 5 hours.
322-323. **Business Law.** Legal aspects of common business transactions, contracts, real estate transactions, marketing of goods, negotiable instruments, surveys of labor law and legislation, and the public interest in labor disputes; the uniform code provision. 6 hours.

331. **Production Control.** Planning and controlling the production of goods; procurement inventory, tools, loading, intra-company traffic and communication, design mechanization and automation. 3 hours.

332. **Time and Motion Study.** The theory and application of time and motion study techniques to the improvement of industrial operating process charts, fatigue, and relation of time standards to wage incentives. 3 hours.

333. **Quality Control.** Controlling the quality of materials, workmanship and inspection; procedures in establishing standards, tests and comparisons of products, use of statistical quality control charts. 3 hours.

341. **Labor Economics.** Labor as a factor in production; labor mobility; theories of the determination of wages, and bargaining theory; history and methods of labor unions, and government relations to labor. 3 hours.

351. **Marketing.** Management-oriented; concepts, processes, and problems of marketing; channels of distribution, marketing research, brands and price policies; case method approach largely used. 3 hours.

352-353. **Money and Banking.** The organization and operation of American banking institutions; theories of money and credit; commercial banking practices; reserve banking; monetary and banking laws; money market; money and credit in the world economy. Prerequisite: Economics 201-202-203. 6 hours.

362. **Corporation Finance.** Handling and flow of corporate funds; problems of fixed and working capital, income level, dividend policy and the use of borrowing; case analysis used. 3 hours.

363. **Personnel Management.** The functions of the personnel department in industry. Case analysis of problems in selection, training, and incentives; the human factor in industry. 3 hours.

370. **Managerial Accounting.** An introduction to the accounting-management relationship designed to follow the first year of basic accounting, for both accounting and non-accounting majors; the use of accounting data for managerial decision. Prerequisite: Accounting 133. 3 hours.

371. **Salesmanship.** The principles, techniques and problems of salesmanship; sales management, recruiting, controlling and evaluating the sales force; market research, channels of distribution and pricing. 3 hours.
372. Advertising. Advertising as a phase of the marketing process; selling appeals and types of advertising; consideration of copy and media; problems of publishing and broadcast advertising. 3 hours.

373. Transportation. Waterway, railway, highway, pipeline and air transportation and their development in the U.S.; rates and their effect on location and development of industry; government regulation; and labor relations. 3 hours.

381-382. Federal Income Tax. The Federal Income Tax structure as related to individuals, and corporations problems involving the law and regulations; tax areas applicable to different forms of business organization.
Prerequisite: Accounting 133. 6 hours.

383. Intermediate Economic Theory. Special problems of pricing, production, and distribution under perfect competition, oligopoly, duopoly, and monopoly in the American economy. 3 hours.

391. Business Communications. The techniques of writing business letters and reports; efficient and accurate communication of economic and business facts and presentation of conclusions for management decision-making; further study of English for self-improvement. 3 hours.

403. Auditing. Auditing accounting records and statements, making of working papers and the writing of audit papers for making a complete audit.
Prerequisite: Intermediate Accounting 301. 5 hours.

411. Comparative Economic Systems. Capitalism, socialism, fascism and communism as they touch on the economics of pricing, production and distribution. 3 hours.

413. Budgeting. Estimating income and expenses; organization for controlling expenditures and for measuring the operating efficiency of the organization.
Prerequisite: Accounting 133. 5 hours.

435. International Economics. Theories and current problems of trade between nations; governmental restrictions and controls; the importance of multilateral trade; balance of payments; scarce resources; population, and employment trends. 3 hours.

423. Public Finance. How the Federal government and local units of government finance themselves; taxation in its many forms, the securities issued by government units and the national debt of the United States. 3 hours.

432. Accounting Systems. This course is designed to lead into aspects of modern system building-automated data processing systems. It covers the important principles, basic concepts and standards, methodology of work and the human factors. Prerequisite: Intermediate Accounting. 301. 3 hours.
433. **DATA PROCESSING.** The use of automatic computers in accounting systems. Graphic presentations supplement the text. Prerequisite: Accounting 133. 3 hours.

440. **SENIOR COMPREHENSIVE.** Preparation of the student for the Senior Comprehensive examination; integration of ideas and formulation of a philosophy. Required of all senior majors. 3 hours.

441. **ECONOMIC HISTORY OF EUROPE.** The beginnings of trade, medieval economic relationships, and the rise of invention and technology culminating in the Industrial Revolution; economic rivalries leading to World War I. 3 hours.

442. **HISTORY OF ECONOMIC THOUGHT.** The development of economic thought from Greek and Hebrew writers to modern economists; Adam Smith, Malthus, Ricardo, Marx, Marshall, Keynes and modern economists; Test and original sources. 3 hours.

450. **MANAGERIAL PROBLEMS.** Open to selected seniors as independent study. Comprehensive reading in the field of management and the use of the case method. Discussions to be arranged. 3 hours.

451. **ADVANCED ACCOUNTING.** Departmental, manufacturing, branch and consignment, contractor's real estate development, receivership and estate accounting. Prerequisite: Intermediate Accounting 301. 5 hours.

461. **INVESTMENTS.** The investment of savings; common and preferred stocks, bonds, building and loan shares, life insurance, real estate; firms analyzed for investment desirability; the processes of investing and the operations of the securities markets. 3 hours.

462. **INSURANCE.** Chief applications of insurance—life, health and disability, fire, casualty and marine; corporate bonding, pensions and group insurance; actual insurance problems presented by experienced operatives. 3 hours.

**EDUCATION**

**DEPARTMENT 141**

PROFESSORS HANSON, JONES, BEHRENS, SPENCER; ASSOCIATE PROFESSOR VAYHINGER (Chairman); ASSISTANT PROFESSORS ELLERY, MACNAUGHTON, PARSONS, RUBECK, VAN ATTA.

The Teacher Education Program is designed primarily to aid present and prospective teachers in helping themselves, children and youth identify and meet more effectively their physical, mental, social, personal, and spiritual needs. It is realized that self-improvement will occur among education students as they develop successful techniques in the promotion of the learning process, and acquire useful knowledge that they can impart to others.
Experiences in working with children and youth enable education students to relate theory to practice and to use content in the actual solving of significant problems of living.

To realize the objectives of the Department, public school experiences are utilized.

The Division of Teacher Education, in cooperation with the other divisions within the College of Liberal Arts, offers programs leading to certification in the following fields:

1. Elementary Education
   a. Provisional Elementary Certificate and Bachelor of Science in Education Degree.

   The course program as outlined below meets the requirements for the Bachelor of Science in Education degree and the Provisional Elementary Certificate (standard certificate).

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>English 151</td>
<td>3</td>
<td>English 152</td>
<td>3</td>
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<tr>
<td>West. Civ. 111</td>
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<td>West. Civ. 112</td>
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<td>Intro. Ed. 121</td>
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<td>Art 101</td>
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<td>Music 111</td>
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<tr>
<td>Math 111</td>
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<td>L.A. Orient.*</td>
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15 15 16

* Does not apply toward 180 required for graduation.

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<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Phil./or Relg.</td>
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<td>Phil./or Relg.</td>
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<tr>
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<td>Health Ed. 121</td>
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<td>Biology 112</td>
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<td>Biology 111</td>
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<tr>
<td>or Chemistry 105**</td>
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<td>Chemistry 105**</td>
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<tr>
<td>Psych. 211</td>
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<td>Speech 260 or 271</td>
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<td>Child Dev. 223</td>
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### THIRD YEAR

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<th>Fall</th>
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<tr>
<td></td>
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<td>or Am. Govt. 202</td>
<td>or Am. Govt. 203</td>
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<td></td>
<td>or Am. Govt. 201</td>
<td>Child. Lit. 233 3</td>
<td>Teach. Soc. St. 311 3</td>
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<td></td>
<td>or El. Sch. Curr. 301</td>
<td>Teach. Read. 341 3</td>
<td>Ohio Hist. 303 3</td>
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<td>or Teach. Arith. 252</td>
<td>Hst. Art 250 3</td>
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### FOURTH YEAR

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<tr>
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<td>Eval. &amp; Meas. 460 3</td>
<td>Audio-Vis. Aids 430 3</td>
<td>Student Teaching.</td>
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<td>Geography 433 3</td>
<td>Hist. &amp; Phil.</td>
<td>Educ. 470 15</td>
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<td>of Educ. 401 3</td>
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<td></td>
<td></td>
<td>Electives 9</td>
<td></td>
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</table>

- b. Dual—Elementary Education major with teaching field in Secondary Education (See Department of Education for course requirements)

* Does not apply toward 180 required for graduation.

** Those students who take Chemistry 105 in the Fall Quarter take Biology 112 in the Winter Quarter. Those students who take Biology 111 in the Fall Quarter take Chemistry 105 in the Winter Quarter.

### 2. Special Certification

a. Art Education
   - Certification requirements for those majoring in Art Education are available from the department chairman.

b. Health and Physical Education
   1) Provisional Special Certificate (Elementary and Secondary)
   - See Department of Health and Physical Education for program of studies.

c. Industrial Arts Education
   1) Provisional Special Certificate (Elementary and Secondary)
   - See Department of Industrial Arts for program of studies.
d. Music Education

1) Provisional Special Certificate (Elementary and Secondary)
See Department of Music for program of studies.

3. Secondary Education. Requirements for certification in the various secondary teaching fields may be obtained from the Office of the Director of Teacher Education. Programs of studies leading to certification in the Social Studies Comprehensive major and Natural Science comprehensive are as follows:

**Comprehensive Science Major**

**PROGRAM OF STUDIES**

**FRESHMAN YEAR**

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>English 151</td>
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<td>English 152</td>
<td>3</td>
</tr>
<tr>
<td>Intro. to Educ. 121</td>
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<td>Math 152</td>
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<td>Math 151</td>
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<td>Biology 112</td>
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<td>Chemistry 132</td>
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<td>Chemistry 131</td>
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<td>Soc. Science</td>
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**SOPHOMORE YEAR**

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<thead>
<tr>
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<tr>
<td>Chemistry 231</td>
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<td>Chemistry 232</td>
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<td>Physics 241</td>
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<td>Physics 242</td>
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<tr>
<td>Math 251</td>
<td>5</td>
<td>Math 252</td>
<td>5</td>
</tr>
<tr>
<td>P &amp; R 231</td>
<td>3</td>
<td>P &amp; R 232</td>
<td>3</td>
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**JUNIOR YEAR**

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<tbody>
<tr>
<td>Gen. Psych. 211</td>
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<td>Literature</td>
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<td>Adol. Grow. &amp; Dev.</td>
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<tr>
<td>School &amp; Society</td>
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<td>Biology 202</td>
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<tr>
<td>Biology 201</td>
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<td>Soc. Science</td>
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<tr>
<td>Physics 210</td>
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<td>Physics 320</td>
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### SENIOR YEAR

#### Concentration in Physics

<table>
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<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Physics 250</td>
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<tr>
<td>Soc. Science</td>
<td>3</td>
</tr>
<tr>
<td>Eval. &amp; Meas. 460</td>
<td>3</td>
</tr>
<tr>
<td>Physics Adv. Lab.</td>
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</tr>
<tr>
<td>Speech 271</td>
<td>3</td>
</tr>
<tr>
<td>Fine or Applied Art</td>
<td>3</td>
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<tr>
<td>Soc. Science</td>
<td>3</td>
</tr>
<tr>
<td>Education Elective</td>
<td>3</td>
</tr>
<tr>
<td>Fine or Applied Art</td>
<td>3</td>
</tr>
<tr>
<td>Physics 302</td>
<td>5</td>
</tr>
<tr>
<td>Elective</td>
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<tr>
<td>Physics 423</td>
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<td>Electives</td>
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<tr>
<td>Student Teaching, Educ. 480</td>
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<td><strong>Total</strong></td>
<td>17</td>
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</tbody>
</table>

#### Concentration in Biology

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 301 or 331</td>
<td>4</td>
</tr>
<tr>
<td>Biology 302 or 332</td>
<td>4</td>
</tr>
<tr>
<td>Soc. Science</td>
<td>3</td>
</tr>
<tr>
<td>Soc. Science</td>
<td>3</td>
</tr>
<tr>
<td>Eval. &amp; Meas. 460</td>
<td>3</td>
</tr>
<tr>
<td>Educ. Elective</td>
<td>3</td>
</tr>
<tr>
<td>Biology 303 or 333</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>2-3</td>
</tr>
<tr>
<td>Student Teaching, Educ. 480</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
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</tbody>
</table>

1. Social Studies Comprehensive—68 hours
   Students planning to teach in the fields of Social Studies can take course work in the field according to one of the programs listed below.

#### PROGRAM 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Western Civilization</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>American History</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Elective in History</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Political Science</td>
<td>18 hrs.</td>
</tr>
<tr>
<td>Sociology</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Economics</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Geography</td>
<td>3-5 hrs.</td>
</tr>
<tr>
<td>Elective in Social Studies</td>
<td>3-6 hrs.</td>
</tr>
</tbody>
</table>

#### PROGRAM 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Civilization</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>American History</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Elective in History</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Political Science</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Sociology</td>
<td>18 hrs.</td>
</tr>
<tr>
<td>Economics</td>
<td>9 hrs.</td>
</tr>
<tr>
<td>Geography</td>
<td>3-5 hrs.</td>
</tr>
<tr>
<td>Elective in Social Studies</td>
<td>3-6 hrs.</td>
</tr>
</tbody>
</table>

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*Note: The document contains a table and a list of courses with their respective credits for the senior year, focusing on concentration options in Physics and Biology. Additionally, it mentions the Social Studies Comprehensive requirement and provides program options for students planning to teach in Social Studies.*
PROGRAM 3

Western Civilization 9 hrs.
American History 9 hrs.
Elective in History 9 hrs.
Political Science 9 hrs.
Sociology 9 hrs.
Economics 18 hrs.
Geography 3-5 hrs.
Elective in Social Studies 3-6 hrs.

At the end of the sophomore year formal application must be made to be admitted as a candidate for the degree, Bachelor of Science in Education. Acceptance of candidacy will be determined by the Director of Teacher Education upon the recommendation of the Teacher Education Council. The student must have a 2.25 accumulative quality point average, and have completed 75% of prescribed freshman and sophomore course work. The above requirements apply to all students working toward teacher certification.

Students preparing to teach at either the elementary or secondary level must have their programs approved by the Head of the Division of Teacher Education. Those students preparing to teach at the secondary level must meet the requirements in an area of concentration under the direction of the appropriate department chairman.

PROFESSIONAL EDUCATION

Students preparing to teach in secondary schools are required to complete a minimum of 75% of a major in a subject matter department in the College of Liberal Arts and have the endorsement of that department’s chairman before qualifying for student teaching.

Professional education requirements for students in the field of secondary education are listed below:

1. **REQUIRED COURSES:**
   121 Introduction to Education 3 hrs.
   (prerequisite: Gen. Psych. 211) 3 hrs.
   370 School and Society 3 hrs.
   390 High School Curriculum 3 hrs.
   or
   450 Methods of Teaching in High School 3 hrs.
   451 Special Methods of Teaching 3 hrs.
   460 Evaluation and Measurement 9 hrs.
   480 Student Teaching

   **27 hrs.**
2. **On elective from the following courses:**
   - 313 Educational Psychology 3 hrs.
   - 343 Human Growth & Development 3 hrs.
   - 401 History & Philosophy of Education 3 hrs.
   - 402 School Organization & Administration 3 hrs.
   - 430 Audio-Visual Aids 3 hrs.
   - 440 Special Problems in Teacher Educ. 1-3 hrs.

**TOTAL**

30 hrs.

**General Courses**

121. **Introduction to Education.** The teaching profession, its requirements, opportunities, and problems; the nature and function of our educational system. (Required of all beginning students in the Division of Teacher Education.) *3 hours.*

313. **Educational Psychology.** A study of the learning process and conditions that promote learning. Prerequisite: Psychology 211. *3 hours.*

401. **History and Philosophy of Education.** Modern educational practice; historical changes in instructional processes and ideas; educational beliefs and points of view; the purpose of Education in American Democracy. *3 hours.*

402. **School Administration and Organization.** The American public school system, its organization and administrative units, and other agencies through which it is managed. The administrative tasks for which a classroom teacher is responsible. *3 hours.*

420. **Curriculum Improvement.** Individual and group problems growing out of students' own school situations. *3 hours.*

430. **Audio-Visual Aids in Education.** Audio and visual materials; their uses in the promotion of the learning process. *3 hours.*

440. **Problems in Teacher Education.** Individual study, investigation, and research in the field of professional teacher education. Open to qualified seniors with approval of the department chairman. *1-3 hours.*

460. **Evaluation and Measurement of Pupil Progress.** Evaluation and measurement as they apply to instruction. *3 hours.*
ELEMENTARY EDUCATION COURSE DESCRIPTION

223. Child Development. Characteristics of the child at different levels of maturity; physical, mental and emotional growth; growth and organization of meanings; control of social and ethical behavior; development of personality. Required of elementary education majors. Prerequisite: Psychology 211. 3 hours.

233. Children's Literature. Literature for elementary school children; literature in the education of the child; the teaching of literature, its integration with other school activities. 3 hours.

252. Teaching Arithmetic. Methods and principles underlying the teaching of arithmetic in the elementary grades; diagnosis and remedial work; preparation and evaluation of materials of instruction. Prerequisite: Math 111 and 112. 3 hours.

283. Teaching of Science for the Elementary Teacher. The teaching of Science in the elementary grades; organization and use of materials. 3 hours.

301. The Elementary School Curriculum. Learning situations in the classroom in harmony with basic psychological principles of learning; the objectives of elementary education. 3 hours.

310. Reading Improvement. The reading process, comprehension and speed, basic reading skills; prevention and treatment of individual problems. 3 hours.

311. Teaching of the Social Studies in the Elementary School. Objectives, methods, modern tendencies and evaluation in history, geography, civics, and related fields, planning of experience units and materials of instruction. 3 hours.

312. Teaching of Language Arts in Elementary School. Teaching oral and written expression, handwriting and spelling and their relation to other subjects in the curriculum; the organization and administration of a functional language arts program. 3 hours.

330. Kindergarten Methods and Materials. Programs and practices in the kindergarten of four and five-year-olds. Advanced students in education and by special permission. Given upon sufficient demand. 3 hours.

340. Primary Methods and Materials. Programs and practices in the primary grades required of all students who are candidates for the Kindergarten-Primary Certificate. 3 hours.
350. **Primary Music Methods.** Music techniques, teaching procedures, and the use of materials in the primary grades; for music teachers and supervisors. 3 hours.

341. **Teaching of Reading.** Teaching reading in the elementary grades; reading readiness, phonics, oral and silent reading, diagnostic and remedial measures, evaluation of textbooks and tests. 3 hours.

360. **Intermediate Music Methods.** Music techniques, teaching procedures and the use of materials in the intermediate grades; for music teachers and supervisors. 3 hours.

410. **Education of Slow Learning Children.** Designed to help teachers understand and deal with problems of the slow learner. Causes, diagnosis, and understanding of the learner are emphasized. Ways to aid children reach higher levels of development are stressed. Much attention is given to conditions that aid children in the promotion of better self-concepts. 3 hours.

411. **Language Arts for Slow Learning Children.** Includes reading, writing, spelling, oral and written communication. Emphasis on methods and materials geared to the slow learner. 3 hours.

412. **Arithmetic and Science for Slow Learning Children.** Emphasis on first hand experiences involving arithmetic and science. Methods and materials are conducive to promotion of learning on the particular level of the child. 3 hours.

413. **Social Studies for Slow Learning Children.** Emphasis on selection, organization and development of material appropriate for the developmental stage of the children. Appropriate social studies units which aid children in better understanding the historical, geographical and economic areas of living. Promotion of desirable human relations is stressed. 3 hours.

414. **Occupational Orientation and Job Preparation for Slow Learning Children.** Methods for developing employable skills with slow learning children. Age levels at which certain emphases must be started. 3 hours.

416. **Education of Exceptional Children.** Ways to promote learning with atypical school children who are above or below normal expectations of children. From mental, social and physical standpoints. 3 hours.

470. **Student Teaching in the Elementary Grades.** Planning and teaching under supervision in the elementary grades; weekly seminar on campus. Prerequisites: senior rank; scholarship average of 2.25 or higher in education courses with no grade in any course lower than "C" for the Dual Certificate, a
scholarship average of 2.25 or higher in required courses in the subject sequence with no grade lower than "C"; a desirable teaching personality including interest in teaching, social adaptability, the ability to get along with people, responsibility and high moral standards; effective communicative skills in speaking and writing; approved by the Director of Teacher Education.

SECONDARY EDUCATION COURSE DESCRIPTION

333. Adolescent Growth and Development. The adolescent, his physical, social, emotional, and intellectual development; in accordance with genetic constitution and environmental forces from birth. Prerequisite: Psychology 211. 3 hours.

343. Human Growth and Development. Parallel to Education 141223. A study of the social and developmental factors underlying high school instruction. 3 hours.

370. School and Society. Schools in relation to their supporting society; democracy in its relation to public schools; the responsibilities of educators to the community and to the school; the nature, type, and limitations of both the official and unofficial controls of the public school. 3 hours.

390. The High School Curriculum. A study of secondary school curriculum practices, instructional materials, curriculum development, curriculum, changes and trends. 3 hours.

433. Driver Education. For those who plan to teach driving in the public schools; classes and driving demonstrations daily. No other course can be taken concurrently. 3 hours.

450. Teaching Methods in the Secondary School. Methods, devices, and techniques which are most effective in directing learning in the various subject areas at the high school level; observations and evaluations of actual classroom situations. 3 hours.

451. Teaching Methods in Special High School Teaching Areas. Similar to Education 141450 with emphasis upon the student's major teaching area; observation and evaluation of classroom situations. 3 hours.

480. Student Teaching—Junior and Senior High School. To be eligible for student teaching the candidate must have senior rank; have a cumulative scholarship average of 2.25; have a scholarship average of 2.25 or higher in
education courses with no grade in any course lower than "C"; students preparing to teach at the secondary level, a scholarship average of 2.25 or higher in required courses in the subject matter sequence with no grade lower than "C"; have completed or be in the process of completing the following courses, preferably in this order: Introduction to Education, Adolescent Growth & Development (prerequisite: General Psychology 211), School and Society, High School Curriculum, Special Methods or High School Methods; teach either in his major or minor teaching field; possess a desirable teaching personality, including interest in teaching, social adaptability, the ability to get along with people, responsibility and high moral standards; must demonstrate effective communicative skills in speaking and writing; be approved by the Director of Teacher Education and by the chairman of his department. The work consists of planning and teaching under supervision in the junior or senior high school one-half day, five days per week for one quarter and an average of one hour per week with supervision on the campus. 9 hours.

ENGLISH, SPEECH AND THEATRE

(Department 112)

Professor Hastings, Associate Professors Dornbusch (Chairman), Bartlett, Bennett, Morton, Price; Assistant Professors Belch, Gerdes, Spelman (on leave); Mr. Bell, Miss Hunt, Mr. Kissell, Mrs. Miller, Mrs. Mitchell, Mr. Oliver, Mrs. Shult, Mr. Zwerling.

The courses in English, Speech, and Theatre develop skills in clear and effective written and oral communication, understanding of the nature of language, and discrimination in reading literature; they provide a variety of speech and theatre activities; and they offer advanced work to those who plan to teach in the public school or do graduate study.

Classification of courses within the department is shown by the middle digit of the course number: 0-3, Literature; 4-5, Language; 6-7, Speech; 8-9, Theatre.

The Department of English, Speech and Theatre offers three majors as follows: English: For a major in English the following courses are required: English 200, 201-202-203, 211-212-213 (For majors, 201-202-203 are prerequisites for 211-212-213), 311 or 312 or 313, four of the following courses: 321, 322, 323, 324, 325.

Also required are 350, 410 (prerequisite: 350), 440.

These requirements meet the 45 hour minimum for a major in English. Majors are also encouraged to take up to 15 hours of electives in English (a
maximum of 60 hours in English). Two years of French or German and one year of English History, preferably taken in the major’s junior year, are also required.

The following courses in Speech and Theatre are recommended for students preparing to teach; Speech 271 or 272, Speech 261, Speech 262, Theatre 281.

English 151-152-153 does not count toward a major nor does any course with a grade below C.

*Speech:* For a major in Speech the following courses are required: Speech 272 or 273, Speech 371, 372 and 373, Speech 261, Speech 262, Speech 470, English 350.

Also, the student must have at least three hours of Speech 270 and may get credit for six. Additional courses must be selected from the speech and theatre offerings to complete 45 hours. Speech 271 does not count toward a major. No course with a grade below C may be counted toward the major. Two years of a modern foreign language are required. Speech majors can work toward secondary teaching certification.

*Theatre:* For a major in theatre the following courses are required: Speech 261, 262; Speech 271 or 272; Theatre 291, 292, 293; Theatre 281; Theatre 384, 385, 386; Theatre 481, 482, 483; and Theatre 490. Electives must be selected from Speech and Theatre to complete 45 hours. In addition to the minimum requirement of 45 hours, nine hours of dramatic literature beyond the liberal arts general literature requirement and two years of a modern foreign language are required. No course with a grade below C may be counted toward the major.

**ENGLISH COURSES**

151-152-153. **Composition.** Designed to develop each student’s proficiency in the writing of English prose. 151—exposition; 152—argumentation and criticism; 153—the longer research paper. 9 hours.

200. **Principles of Literary Criticism.** An introduction to critical approaches to literature, applied to specific works in the various genres. 3 hours.

201-202-203. **Introduction to English Literature.** A chronological study of the poetry and prose of the major British writers from Chaucer to T. S. Eliot, the development of representative English literary forms. 9 hours.

211-212-213. **Introduction to American Literature.** A chronological study of the poetry and prose of the major American writers from the Puritan Age to the modern period, the development of American thought and literary forms. 9 hours.
241-242-243. JOURNALISM. Basic instruction in newspaper organization, procedures, and techniques. Students work closely with or are members of the staff of the Northern Review. 9 hours.

PREREQUISITES FOR ADVANCED COURSES: Nine hours of Introduction to English Literature (English 201-202-203) and/or Introduction to American Literature (English 211-212-213), or consent of the Chairman, are required for admission to any 300-400 level literature course.

301-302. THE BRITISH NOVEL. The development of the novel as a literary form. 301—from Defoe to Austen; 302—from Dickens to Joyce. 6 hours. Alternate years. Offered 1966-67.

303. TWENTIETH CENTURY AMERICAN FICTION. A study of the development of the American novel after World War I, with emphasis on the major novelists. 3 hours. Alternate years. Offered 1966-67.

304. THE SHORT STORY. A study of the works of the master short story writers; understanding and appreciation of the short story as a literary form. 3 hours.

311-312-313. SHAKESPEARE AND HIS AGE. 311—the early comedies, the early tragedies, the narrative poems, and the sonnets, the poet’s life and times; 312—the later comedies and the development of the history plays; 313—concentration upon the great tragedies and the dramatic romances as a chronological study in the development of Shakespeare as poet and dramatist. The three quarters should be taken in sequence. 9 hours.

321. MILTON AND HIS AGE. Paradise Lost, Samson Agonistes, and Milton’s major lyric poems; Donne and the metaphysical tradition; the 17th Century background. 3 hours. Alternate years.

322. RESTORATION AND THE EIGHTEENTH CENTURY. The prose and poetry of the major writers of the Neo-Classical period, beginning with Dryden and the Restoration and ending with Blake, the forerunner of the Romantic Period. 3 hours. Alternate years.

323. THE ENGLISH ROMANTIC MOVEMENT. Poetry and prose of the early nineteenth century with emphasis upon the selected writings of Wordsworth, Coleridge, Byron, Shelley, and Keats. 3 hours. Alternate years.

324. THE VICTORIAN PERIOD. A study of typical Victorian attitudes, conflicts, and conditions as reflected in the major prose and poetry of the Age. 3 hours. Alternate years. Offered 1966-67.

331-332-333. **The Drama.** The development of the drama as a literary form. 331—a study of representative plays from Sophocles through the English Restoration; 332—representative plays of Europe and England in the eighteenth and nineteenth centuries; 333—plays of modern Europe and America. 9 hours. Alternate years.

334-335. **World Literature.** A chronological and developmental study of Continental masterpieces excluding drama. All works are read in English translation. 6 hours. Alternate years.

337, 338, 339. **Advanced American Literature.** An advanced study of the major writers of the Puritan Age and the Age of Reason, of American Romanticism, and of American Realism and Naturalism up to World War I. 9 hours.

340. **Creative Writing.** Instruction in the discipline of writing poems, short stories, and magazine articles; criticism of student work in class and in conference. 3 hours.

350. **The English Language.** A study of the historical development of the English language and an introduction to modern linguistics. 3 hours.

410. **Chaucer and His Age.** A chronological study of Chaucer's life in relation to his literary development; the chief literary forms of the Middle Ages with special reference to the Medieval Romance; skill in reading Middle English. 3 hours.

440. **The Senior Seminar.** Seminars and independent study for the preparation of a thesis. 3 hours.

**Speech Courses**

260. **Speech for the Elementary Teacher.** The recognition of speech disorders; speech and listening activities for the normal school child. 3 hours.

261. **Voice and Diction.** Diagnosis of articulatory and voice problems; intensive drill with poetic and prose literature in ascertaining deviation in production and articulation of speech sounds. 3 hours.

262. **Oral Interpretation.** The analysis and oral projection of modern prose and poetry; theories and practice of the art of oral interpretation. 3 hours.

270. **Speech Activities.** Extra-curricular debate and/or individual speech activities, including intercollegiate meets. May be repeated for credit. 1 hour.
271. **Public Speaking I.** Oral Communication in the various areas of speech, practice in original public speaking and listening. 3 hours.

272. **Public Speaking II.** Extemporaneous public speaking; clear, orderly presentation of ideas for a specific purpose. Prerequisite: Speech 271 or one unit of high school speech. 3 hours.

273. **Public Speaking III.** Public speaking; oral style and delivery. Prerequisite: Speech 272 or consent of the instructor. 3 hours.

360. **Parliamentary Procedure.** Introduction to parliamentary procedures. Prerequisite: Three hours of speech credit. 1 hour.

363. **Advanced Oral Interpretation.** Analysis and oral projection of classic forms of prose and poetry; the art of oral interpretation. Prerequisites: Speech 261 and 262. 3 hours.

371. **Discussion.** Group discussion; cooperative problem solving and deliberative thinking. An opportunity to participate in and lead discussion is provided. Prerequisites: Speech 271 or 272. 3 hours.

372. **Debate.** Argumentative speaking and debate; proposition analysis, use of evidence, elementary logic, and case construction. Prerequisites: Speech 271 or 272. 3 hours.

373. **Advanced Persuasive Speaking.** Content and rhetoric of public speeches; persuasive theory and techniques. Preparation and delivery of original speeches based on current problems of interest and importance. Prerequisites: Speech 273 or 371 or 372. 3 hours.

470. **Speech Seminar.** Qualified seniors concentrating in Speech may undertake an individual project supervised by a member of the department. A maximum of three hours of credit is permitted. Prerequisites: The student must have passed the English proficiency examination, or have approval of the department chairman upon special recommendations by the member of the department who will supervise the project.

**Theatre Courses**

280. **Theatre Activities.** Participation in some aspect of a theatrical production. 30 hours time per quarter is required for 1 credit hour. A maximum of six quarters. 1 hour.
281. ACTING FUNDAMENTALS. The modern mechanics and conventions of acting with both oral and written practice. Prerequisite: Consent of Instructor. 3 hours.

291. INTRODUCTION TO THEATRE. An audience centered survey of theatrical theories and techniques establishing standards of judgment and appreciation. 3 hours.

292, 293. THEATRE HISTORY. The theatre from its beginnings in primitive man to the present; the development of the physical theatre and the audience of the period. The first term covers the period from the beginnings to the eighteenth century, the second term from the eighteenth century to the present, with attention also to the oriental theatre. 6 hours.

382. ADVANCED ACTING. The theories and styles of period acting with both oral and written practice. Prerequisite: Theatre 281. 3 hours.

383. CHILDREN'S THEATRE. Selecting and producing drama for the child audience; both classroom study and participation in the children's theatre touring company. Prerequisite: 281 or two major bill productions. 3 hours.

384. FUNDAMENTALS OF DIRECTING. The fundamental theories of directing applied to the directing of a modern one-act play for public production. Prerequisite: 281 or major role in two major bill productions. 3 hours.

385. STAGECRAFT. A study of current theory and practice of building, rigging, and shifting stage scenery; experience working in the shop and on productions required. 3 hours.

386. STAGE LIGHTING. Control of intensity, color, and distribution of lights in theatrical production; introduction to the use of theatrical lighting equipment, work on light crews for productions. 3 hours.

481. SCENE DESIGN. The planning of stage scenery and its relation to other aspects of play production. The actual presentation of designs through color sketches, scale floor plans, models and working drawings. Practical work in building and painting scenery from designs. Prerequisites: Theatre 384, 385, 386 or consent of Instructor. 3 hours.

482. ADVANCED DIRECTING. A study of the fundamental theories of period directing applied to the production of either a play not previously produced or a cutting of a three act classic drama (Greek, Roman, Shakesperean, or classic French or German) to one-act proportion for public production. Prerequisite: Theatre 481. 3 hours.
483. **PROBLEMS IN PRODUCTION**. A composite study of the problems in the organization of the dramatic production; the duties of the stage manager, business manager, producer-director, costume master, and the scene and light designer. Prerequisite: Theatre 482. 3 hours.

490. **SEMINAR IN THEATRE**. Upon the recommendation of the theatre faculty a student may select a seminar in one of the following areas:

**Directing**: The directing of a three-act play for presentation on the major bill. Prerequisites: Assisting the director of theatre on one major bill production, serving as stage manager, lighting technician, house manager, and costume master and Theatre 483.

**Acting**: The production of a monodrama for presentation on the major bill. Prerequisites: Speech 261, 262, and 263 and Theatre 281, 382 and roles in eight productions on the major bill.

**Technical Production**: The design and execution of scenery and lighting for a three-act play on the major bill. Prerequisite: Theatre 481 and experience as stage manager and lighting technician.

**Playwriting**: The writing of a one-act play which is acceptable for production by Theatre 482. Prerequisite: 291 or the equivalent.

**History/Criticism**: An analysis of the work of modern or classic critics or period studies in dramatic criticism. Prerequisites: Theatre 291, 292, 293. 3 credits per unit.

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**FOREIGN LANGUAGES**

(Department 113)

Professor Schmitz, Assistant Professors Elias, Dr. Espino, Mrs. Rassoul, Mr. Stern, Mrs. Sutton

The ultimate value of knowing foreign languages and literature helps the student to cultivate a greater breadth and comprehensiveness of thought, to arrive at an understanding of a foreign culture, and to develop a deeper knowledge of the English language and the American cultural heritage.

The various courses in French, German, Spanish, and Russian are designed to meet both practical and cultural needs, promoting proficiency in understanding, speaking, reading and writing the foreign language. All courses are conducted for the most part in the foreign language, so that linguistic proficiency may be acquired along with the study of literature. The department considers a mastery
of the language as the indispensable basis for a significant understanding and interpretation of literature.

The Thomas R. Schoonover Laboratory (with master-tapes, pre-recorded tapes and discs) provides opportunities for practice with tape recorders in 24 semi-soundproof booths, and extends the contact of the student with a living language, aiming at a maximum of active participation; offering recorded materials which have been carefully prepared as an adjunct to class work, coordinated with class instruction; rendering ample opportunity for aural comprehension, auditory-visual drill, speaking, simultaneous and consecutive interpreting, and self-correction.

Elementary and intermediate courses in French, German, Spanish, and Russian may be counted as Upper Division courses if taken during the junior or senior year. Courses conducted entirely in English cannot be counted toward the major.

Students with two years of high school preparation in a foreign language must begin with an intermediate course; those with more than two years should take a placement examination, and may be permitted to take a 300 level course, if approved by the head of the foreign language department.

Requirements for a major in a foreign language:
Prerequisite: 100 course series or two units of high school instruction in a foreign language. Major: 45 hours.

For students desiring to take a field of concentration in either French, German, Spanish or Russian, the following courses are required: One year of either the Intermediate or Scientific courses, one year of courses in Conversation and Composition, one year of Survey of Literature, one year of courses in Civilization or Cultural Development.

Students majoring in a foreign language are urged to spend their junior year studying in a foreign country. The Department of Foreign Languages will provide assistance in placing the student in a foreign university.

Students returning from any period of foreign study may be required to take an oral or written examination (or both, at the discretion of the Dean of the College), for the purpose of determining the credits to be granted.

FRENCH

111-112-113. Elementary French. To develop the ability to understand, speak, read, and write French; functional, rather than formal grammar; early and fluent speaking; elementary reading based on French life, customs and manners. Three hours of class and two scheduled laboratory practices a week. 12 hours.

291. **French Cultural Developments.** Outstanding contributions of French-speaking countries to the cultural heritage of the Western world in the visual arts, music, theatre and literature. The course is conducted in English and counts toward the Humanities requirement in Liberal Arts. Open to all students. *3 hours.*

311, 312, 313. **French Conversation and Composition.** To develop a useful command of the language; readings, slides, recordings, current periodicals and realia are used to stimulate conversation. A study of grammatical and phonetic problems aimed at perfecting clarity and accuracy of expression. *Three class periods and two hours of scheduled laboratory practice per week.* Prerequisite: 211-211-213. *12 hours.*

314, 315, 316. **Survey of French Literature.** A study of the main currents of French literature. Class discussions based on the reading of representative French masterpieces. Prerequisites: French 211-213, 311-313, or the consent of the instructor. *9 hours.*

411, 412, 413. **Civilisation Française.** A survey of the history of France, its topography, industries, government, educational system, journalism. The course, given in French, is required of all French majors. Prerequisite: French 311-313 or consent of instructor. *9 hours.*

410. **French Seminar.** For seniors majoring in French. May be repeated up to 6 hours. *3 hours.*

**German**

121-122-123. **Elementary German.** To develop the ability to understand, speak, read, and write German; functional, rather than formal grammar; early and fluent speaking; elementary reading based on German life, customs, and manners. *Three class hours and two periods of scheduled laboratory practice a week.* *12 hours.*

221-222-223. **Intermediate German.** Review of the fundamentals of grammar, pronunciation, vocabulary and idioms; conversational practice and composition; German life, history, civilization, art, music, illustrated with slides, film strips
and motion pictures with German sound tracks. *Three class periods and two hours of scheduled laboratory practice a week.* Prerequisite: German 121-123 or two years of high school instruction in German. *12 hours.*

224-225-226. **Scientific German.** To enable the student to use German in professional or graduate work; technique of reading advanced German and its application; special needs of each student according to his field of study. German technical magazines and books are used. Prerequisite: German 121-123, or two years of high school instruction in German. *9 hours.*

292. **Germanic Cultural Developments.** Outstanding contributions of Germanic countries to the cultural heritage of the Western World in the visual arts, music, theatre and literature. The course is conducted in English and counts toward the Humanities requirements in Liberal Arts. Open to all students. *3 hours.*

321, 322, 323. **German Conversation and Composition.** To develop both a useful command of the German language and an appreciation of German civilization; recorded conversational dialogues on a variety of topics useful to the student or traveler in Germany, Austria, and Switzerland, films and slides, and current German periodicals are used. An advanced study of grammatical and phonetic problems aimed at perfecting clarity and accuracy of expression. *Three class periods and two hours of scheduled laboratory practice a week.* Prerequisite: German 221-223 or 224-226. *12 hours.*

324, 325, 326. **Survey of German Literature.** Basic monuments of German literature from the earliest times to the present. Lectures, class discussions. Prerequisite: German 221-223; 321, 322, 323, or the consent of the instructor. *9 hours.*

421, 422, 423. **Deutsche Kulturgeschichte.** The course, given in German, integrates the political, economic, social and cultural forces which have shaped Germany. Required of all German majors. Prerequisite: German 221-223; 321, 322, 323, or consent of instructor. *9 hours.*

420. **German Seminar.** For seniors majoring in German. May be repeated up to 6 hours. *3 hours.*

**Spanish**

141, 142, 143. **Elementary Spanish.** To develop the ability to understand, speak, read, and write Spanish; functional, rather than formal grammar; early and fluent speaking; elementary reading based on Spanish life, customs and manners, using materials dealing with Spain, Mexico and South America. *Three class periods and two scheduled laboratory practices. 12 hours.*
241-242-243. **Intermediate Spanish.** A review of grammar and pronunciation; conversational practice and composition; occasional lectures in Spanish on Spanish life, history, arts, crafts, and civilization, illustrated with film strips, slides, photographs, reproductions, and realia. *Three class periods and two scheduled laboratory practices.* Prerequisite: Spanish 141-143, or two years of high school instruction in Spanish. 12 hours.

294. **Hispanic Cultural Developments.** A survey, in English, of the outstanding contributions of Spain and Spanish America to the cultural heritage of the western world; the fine arts, music, theatre and literature. This course counts toward the Humanities requirement in Liberal Arts. Open to all students. 3 hours.

341, 342, 343. **Spanish Conversation and Composition.** To develop a useful command of the language; recorded dialogues on a variety of topics; color slides, film strips, current periodicals and realia; study of commercial Spanish and practice in correspondence useful to students in business or commerce. A study of grammatical and phonetic problems aimed at perfecting clarity and accuracy of expression. *Three class periods and two hours of scheduled laboratory practice per week.* Prerequisite: Spanish 241-242-243. 12 hours.

344, 345, 346. **Survey of Spanish Literature.** A study of the chief authors in the literature of Spain from the beginnings to the present, with special emphasis on the Golden Age. Prerequisite: Spanish 241-243; 341-343, or the consent of the instructor. 9 hours.

347, 348, 349. **Spanish American Literature.** Main currents of Spanish-American literature. Prerequisite: Spanish 241-243, or the consent of the instructor. 9 hours.

441, 442, 443. **Civilizacion Hispanica.** This course, given in Spanish, integrates the political, economic, social, geographical and cultural forces which have shaped Spain and Hispanic America. Required of all Spanish majors. Prerequisite: Spanish 341 342, 343, or consent of instructor. 9 hours.

440. **Spanish Seminar.** For seniors majoring in Spanish. May be repeated up to 6 hours. 3 hours.

**RUSSIAN**

131-132-133. **Elementary Russian.** To develop the ability to understand, speak, read, and write Russian; functional rather than formal grammar; simple conversation based on practical, everyday situations; elementary reading based on Russian life, customs and manners. *Three class periods and two hours of scheduled laboratory practice per week.* 12 hours.
231-232-233. Intermediate Russian. Review of grammar and pronunciation; conversational practice and reading; occasional lectures on Russian history, art and civilization; slides, films and recordings. Three class periods and two hours of scheduled laboratory practice per week. Prerequisite: Russian 131-133. 12 hours.

234-235-236. Scientific Russian. Russian for professional use. The technique of reading advanced Russian scientific and technical material. Emphasis on special needs of the individual student according to his field of study. Prerequisite: Russian 131-133. 9 hours.

293. Russian Cultural Developments. Outstanding contributions of Russia to the cultural heritage of the western world in the visual arts, music, theatre and literature; moving pictures, color slides, film strips and recordings. The course is conducted in English and counts toward the Humanities requirement in Liberal Arts. Open to all students. 3 hours.

331 332, 333. Russian Conversation and Composition. Topics dealing with Russia to develop both a useful command of oral and written idiomatic Russian language, and an appreciation of Russian civilization; recorded conversational dialogues on a variety of topics. Films, slides and current Soviet periodicals are used. Three class periods and two hours of scheduled laboratory practice a week. Prerequisite: Russian 231-233 or 234-236. 12 hours.

334, 335, 336. Survey of Russian Literature. Basic monuments of Russian literature from the Kiev period to the present, with special emphasis on the major classics of the nineteenth century. Prerequisite: Russian 231-233, 331-333, or the consent of the instructor. 9 hours.

431, 432, 433. Russian Civilization. A study of Russian life: intellectual, social and cultural, with emphasis on the modern period. Russian political and cultural history, the Russian Revolution of 1917 and the basic features of Marxism-Leninism. A study of Soviet life. The course is given in Russian, illustrated by slides, films and music recordings, and is required of all Russian majors. Prerequisite: Russian 231-233, 331-333. 9 hours.

430. Russian Seminar. For seniors majoring in Russian. Research or special projects in Russian linguistics, literature or civilization. May be repeated up to 6 hours. 3 hours.

CLASSICAL GREEK

161-162-163. Elementary Greek. To develop the ability to read and interpret classical Greek; selected readings from Greek prose writers; occasional illustrated lectures on Greek civilization. 9 hours.
261-262-263. **Intermediate Greek.** To develop the student's skill in interpreting Greek prose and poetry from the classical period. Illustrated cultural lectures. Prerequisite: Greek 161-163, or equivalent. 9 hours.

**LATIN**

151-152-153. **Elementary Latin.** To develop the ability to read and interpret classical Latin. Occasional illustrated lectures on Roman civilization. 9 hours.

251-252-253. **Intermediate Latin.** Reading from Pliny, Cicero, Ovid, and other Latin writers. Illustrated cultural lectures. Prerequisite: Latin 151-153, or two units of high school Latin, and consent of instructor. 9 hours.

**HISTORY AND POLITICAL SCIENCE**

(Department 132)

Proфессors Hilliard (Chairman), Darlington, Milnar; Assistant Professor Sobers; Dr. Uveges, Mr. Barker, Mrs. Hammond

The History courses stress the evolution of human institutions with a view to developing an informed appreciation of past centuries as well as an understanding of our present civilization. Students majoring in history must take courses in both American and European History and electives in the allied social sciences, particularly political science, sociology, psychology and economics. To be recommended to teach history, a graduate must have taken nine hours in American Government in addition to the hours of his history major.

**HISTORY**

The most appropriate sequence of courses for a field of concentration in history is History of Western Civilization 111, 112, 113; History of the United States 211, 212, 213; History of England 321, 322, 323; Recent American History 361, 362; or Constitutional History of the United States 331, 332; and Recent European History, 374, 375, 376. In addition to the 45 hours required for the major in History, the student must complete nine hours in American Government.

111. **History of Western Civilization to 1517.** 3 hours.

112. **History of Western Civilization: 1517 to 1815.** 3 hours.

113. **History of Western Civilization: 1815 to the Present Time.** An introductory survey of European history. The Medieval background, the Renaissance, the rise of international rivalry, the World Wars and their aftermath. Open to freshmen. 3 hours.
211. History of the United States to 1850. 3 hours.

212. History of the United States to 1900. 3 hours.

213. History of the United States: 1900 to the Present. A study of the political, social and economic development of the United States from the colonial period to the present time. Open to freshmen. 3 hours.

303. History of Ohio. The political and cultural evolution of the state from prehistoric times to the present. Prerequisite: History 211, 212, 213, or consent of the Instructor. 3 hours.

321. English History to 1603. 3 hours.

322. English History: 1603-1815. 3 hours.

323. English History 1815 to the Present Time. The English people in their political, social and institutional development; the growth of the British Empire and evolution of the British Commonwealth of Nations. 3 hours.

324. Renaissance. The political evolution of the Italian communes into city republics; early capitalism and industrial and commercial movements; the culture, art, science, and literature of the period and their influence upon the Church, the Papacy, and modern modes of thought and behavior. 3 hours.

325. Reformation. The Church and European society in the later Middle Ages; culture and thought in the age of the Reformation; the rise of the European state system; Luther and the beginning of the Reformation; Zwingli and Switzerland, Calvin, the expansion of Protestantism in Europe; the Counter Reformation; and the relation of the Reformation to medieval and modern civilization. 3 hours.

327. Revolutionary Era. The French Revolution and Napoleon, with the philosophical background and ideological development of the period, together with their effect on later history. 3 hours.

331-332. Constitutional History of the United States. A survey of the constitutional development of the United States from the colonial period to the present time. Prerequisite: Political Science 201, 202, 203, and History 211, 212, 213. 6 hours.

341-342. American Foreign Relations. The inception, development and present interpretation of the outstanding foreign policies of the United States; the emergence of the United States as a world power; the trend from isolationism. Prerequisite: History 211, 212, 213. 6 hours.
343. **Modern History of the Far East.** A study of China and Japan since 1840 with attention given to other neighboring nations as they affect the development of the Far East. Prerequisite: History 111, 112, 113. **3 hours.**

344. **History of the Modern Middle East.** A study of the social, political, and economic evolution of Turkey, Iran, and the Arab World from 1800 to the present. **3 hours.**

351, 352. **Ancient History.** The development of civilization from pre-history to the fall of Rome. Emphasis is placed upon the early pre-Greek Oriental civilization and the cultural and political contributions of the period. **6 hours.**

353-354. **Latin America.** The conditions in Spain and Portugal leading to Latin American colonization, and the growth of the cultural and political institutions of Latin America. The struggle for independence, and the rise of the modern Latin American Republics. **6 hours.**

361, 362. **Recent American History.** An investigation and intensive study of some of the major movements of United States history since 1900. Prerequisite: History 211, 212, 213, or consent of the instructor. **6 hours.**

374, 375, 376. **Recent European History.** Europe since 1914: imperialism; the alliance system; World War I; the Soviet Union and the fascist powers; relations with the Middle-East and the Far-East; World War II. Prerequisite: History 111, 112, 113. **9 hours.**

381. **The Westward Movement in the United States.** Territorial expansion from colonial times to the present; Indian relations, land policies, transportation and trade. **3 hours.**

382. **The Westward Movement in the United States.** A continuation of 381; the advance of the frontier. The development of sectionalism; the influence of the West on American ideals and institutions. Prerequisite: History 211, 212, 213 or consent of the instructor. **3 hours.**

400. **Human Geography.** The interaction of man and his physical environment. **5 hours.**

411, 412, 413. **Russian History.** Russia from Peter the Great to the present. Emphasis upon economic and social development, political and religious traditions, revolutionary developments, post-war U.S.S.R. and Russia in European affairs. **9 hours.**
433. **Global Geography.** World geography; relationship of the physical environment to the economic, social and political problems of mankind. 3 hours.

440. **History Problems.** Individual investigation on a specific problem. Open to qualified seniors majoring in history. 3 hours.

**POLITICAL SCIENCE**

The courses in political science are designed to prepare the student for the intelligent performance of the functions of citizenship, for entrance into public service, for the study of law, and for graduate study in this field. Those majoring in political science are advised also to pursue courses in sociology, psychology, history and economics.

201-202-203. **American Government.** The origin, development, structure, and functions of national, state and local governments in the United States. Sophomore course. 9 hours.

312. **Municipal Government.** The principal problems of municipal government in the United States. Prerequisite: Political Science 201, 202, 203. 3 hours.

334-335. **Comparative Government.** The governments of England, France, Germany, and Russia. Prerequisite: Political Science 201, 202, 203, or consent of the Instructor. 6 hours.

347. **American Political Parties.** The development of political parties in the United States emphasizing the psychological, sociological, and practical aspects. Prerequisite: Nine hours of Political Science or the consent of the Instructor. 3 hours.

363. **Public Administration.** The principles and problems of administration in national, state and local government in the United States. Prerequisite: Political Science 201, 202, 203 or the consent of the Instructor. 3 hours.

371. **International Relations.** The forces which determine the policies of the major world powers. 3 hours.

372. **International Organization.** The principles of international organization. A comparative analysis of the objectives, structure, machinery, agencies, and procedures of the League of Nations, the United Nations. 3 hours.

373. **International Law.** Development of the law governing the relationship between states, its nature, sources and applications; international agreements, nationality, state responsibilities, and the laws of force and war. 3 hours.
384-385. **European Political Theories.** The development of political philosophy from the period of Ancient Greece to modern times. Prerequisite: Political Science 201, 202, 203, or the consent of the instructor. 3 hours.

386. **American Political Theories.** American political theories from the colonial period to the present. Prerequisite: Nine hours of Political Science or the consent of the Instructor. 3 hours.

391. **Social Forces in American Government.** An investigation of the part played by interest and pressure groups and ideologies in the determination and execution of public policies. 3 hours.

421. **Government of the Soviet Union.** Demographic, historical and ideological basis of Soviet rule. The social, political and governmental structure. The Church, army, courts, and organs of police. 3 hours.

422. **Foreign Policy of the Soviet Union.** Factors in Russian foreign policy; the early years as affected by Marxist ideology, internal condition and foreign interference. Limited cooperation with Western Powers; Second World War and aftermath. 3 hours.

423. **Soviet Social and Economic Institutions.** A study of the Soviet economic structure; general principles of private law, including family law; industrial and trade relations; labor law; and collective farms. 3 hours.

450. **Political Science Problems.** Individual investigation in the field of political science. Open to qualified seniors majoring in this department. 3 hours.

**INDUSTRIAL ARTS**

(Department 142)

Associate Professor Kain (Chairman), Assistant Professor Bowling

The principal objective of the Department of Industrial Arts is to provide a basic education in applied arts and sciences through an understanding of manufacturing, production and consumption, utilizing a variety of materials, processes, operations and procedures.

In the course areas attention is directed toward researching, experimenting, inventing and creative artistry, involving problem-solving situations derived from both theory and practice of the arts and sciences. The courses are organized to provide a basic professional-technical education for persons preparing to teach the arts of industry and technical subjects in the public schools.
This department offers several courses that are of interest and value to both men and women students concentrating in other fields. The recommended courses are: 113 Drawing, 200 Arts and Crafts, 210 Handicrafts for Teachers, 241 Finishing Methods and Materials, 311 Graphic Arts, 323 Lapidary and Jewelry, 430 Photography, 440 Special Problems, and 460 Industrial Materials and Processes. These courses have no prerequisite.

Students concentrating in Industrial Arts complete a minimum of 83 quarter-hours in the areas of drawing, woodworking, metal-working, industrial crafts, graphic arts and printing, electricity-electronics, ceramics, and automotive-power mechanics. Four years of study in these areas and in the areas of liberal arts and professional teacher education qualify students for the Provisional Special Certificate required for teacher certification.

Prospective teachers who do not wish to concentrate in Industrial Arts as a major teaching field but desire to obtain credit sufficient to teach Industrial Arts courses on a minor basis are required to complete a minimum of 52 quarter-hours in the previously listed subject areas. Care should be taken in scheduling in order that courses may be taken in their proper sequence and that sufficient elective time is provided to complete the total credit-hour requirement. Fulfillment of these requirements and those in the field of concentration leads to qualification for the Provisional Teaching Certificate.

Detailed Industrial Arts curriculum for students majoring or minoring in the department can be obtained from the department chairman.

An orientation course (101, 3 hours) designed to assist students in adjusting themselves to college life and to develop a better understanding of the profession, is required of all students seeking a major or minor in Industrial Arts. This course must be taken during the freshman year.

The department has developed an extensive program of visits to museums, manufacturing firms and schools. Industrial Arts students are required to participate in these tours and are encouraged to participate also in a variety of organized professional activities.

101. Industrial Arts Orientation. An introduction to Industrial Arts; philosophical origins and contemporary practices. The fundamental procedures, operations, and the special equipment for each of the several areas of Industrial Arts are briefly explored through laboratory activities and public school visitations.

112. Wood Technology. First in a series of three courses devoted to woodworking; the nature of wood, and its present day applications; forestry, lumbering, grading, preserving, and utilization of wood products and by-products; the identification of common commercial lumbers, strength analysis, control of shrink-
age, methods of preservation and beautification; wood fabrication and joining techniques. 3 hours.

123. **Carpentry and Wood Structures.** The utilization of efficient construction practices in the building of modern wood structures; use of carpentry tools and power equipment. Prerequisite: Engineering Drawing 201, I.A. 101, Wood Technology 112. 3 hours.

200. **Arts and Crafts.** Laboratory experiences in working with craft materials: copper, brass, aluminum, wood, plastics, leather, gemstones, textiles, reed, and others. 3 hours.

201. **Engineering Drawing I.** Use of instruments, applied geometry, lettering, orthographic projection, and pictorial drawing. Offered in the College of Engineering. 2 hours.

202. **Engineering Drawing II.** Continuation of 201. Drawing Developments, intersection, and working drawings. Projects in the main fields of engineering are used. Offered in the College of Engineering. Prerequisite: 201 Drawing. 2 hours.

210. **Handicrafts for Teachers.** To introduce prospective teachers to the basic hand tools and their proper manipulation in simple constructional activities. 3 hours.

213. **Metal Casting.** Wood foundry pattern design and construction; the study of molding materials and equipment; operations and procedures in the construction of sand molds; core construction; melting, pouring and casting of non-ferrous metals; properties of metals and their alloys. 3 hours.

231. **Furniture and Cabinet Construction.** Advanced cabinetry procedures; and techniques in joinery and decorative treatments such as carving, turning, veneering, inlaying, fluting, and associated styling elements. One major project is required. Prerequisite: 113 Drawing, 101 Industrial Arts, 112 Wood Technology. 3 hours.

241. **Finishing Methods and Materials.** Finishing materials, their composition, qualities, and characteristics; protective agents and preservatives; mixing and matching colors; interior floor and wall treatment and finishes; the application of various finishes to wood and metal. 3 hours.

311. **Graphic Arts.** The manipulative processes of duplicating written communications; process printing, mimeographing, spirit duplicating, photographics, blueprinting, block printing, etching, letterpress and offset printing. 3 hours.
321-322. Ceramics. (See Art; page 51)

321. Metalwork Technology. Fundamentals of general metalwork; layout and pattern drafting, bending, forming, seaming, soldering, resistance and oxy-acetylene welding and machining; wrought iron work; construction of fixtures, tools, ornaments, and furniture. 5 hours.

322. Printing. An historical study of printing with typical exercises in composition, typography, imposition, principles of display, platen press, cylinder press operation and offset press operations. Prerequisite: Graphic Arts 331 or permission of the department chairman. 3 hours.

323-324. Lapidary and Jewelry. The fundamentals of the art of lapidary; working with natural and synthetic stones including the sawing, shaping, polishing and mounting of jewelry stones. 6 hours.

332. Metal Machining. Machine shop practice and metalwork technology; the engine lathe, shaper, milling machine, grinder, and power hack-saw; machining of bar stock and castings. Prerequisite: Metalwork Technology 321. 5 hours.

343. Welding Theory and Practice. Welding theory, and weld types; welding metallurgy; electrical resistance and arc welding, oxacetylene welding, brazing, and burning; welded metal fabrications. 5 hours.

402. Fundamentals of Electricity and Electronics. The principles of electricity and their application to laboratory experiments and to the construction of a variety of electrical devices; introduction to electronics; vacuum tubes, rectifiers, power supplies, amplifiers, oscillators, transmitters, and receivers; basic lessons in International Morse Code and amateur radio operating techniques and procedures. Prerequisite: Math. 111-112. 5 hours.

412. Laboratory Planning and Equipment Selection. The architectural features, selection, arrangement, and maintenance of equipment of the modern Industrial Arts laboratory. Prerequisite: Same as 323, Industrial Arts Organization and Methods. 3 hours.

423. Industrial Arts Organization and Methods. A professional course in the methods of teaching Industrial Arts; objectives, preparing lesson plans, organizing courses, laboratory procedures, instructional materials, and administrative practices. Visitations to representative high school laboratories. Open to students having 30 hours or more of Industrial Arts courses. 5 hours.
430. Photography. Techniques of photographic composition, camera types and accessories, photographic optics, and laboratory methods and materials; dark room developing and printing of negatives. 3 hours.

440. Special Problems in Industrial Arts. Juniors or seniors are given special professional assignments, problems in course organization, curriculum content, laboratory equipment maintenance and repair, investigation of research materials, and planned observations on an individual basis. Time for the course is arranged by permission of the department chairman any quarter. 1-3 hours.

451. Automotives & Power Mechanics. The construction and operating principles of the modern motor vehicle; methods of maintaining and repairing automobiles through scientific methods of diagnoses. 5 hours.

460. Industrial Materials and Processes. The manufacturing processes involved in industrial production; classroom discussions, technical motion pictures, and field trips to refineries, mines, quarries, mills, kilns, foundries, machine shops, and other manufacturing firms. 5 hours.

480. Student Teaching in Industrial Arts Education. See Educaton 480. 9 hours.

MATHEMATICS

(Department 123)
Assistant Professors Lhamon (Acting Chairman), Bennett, Kuhns, Roeder, Shult; Mr. McLean and Mrs. Vannorsdall.

Mathematics is a basic subject in both the humanities and the sciences. It provides a language in which problems in social sciences and natural sciences can best be expressed and analyzed. Being itself a culture, great joy and satisfaction can be found by studying the structure of the mathematical language and extending the knowledge of man in this subject.

Career opportunities in mathematics are numerous. The supply of qualified mathematicians has not kept pace with the demand. A mathematics major may find teaching on either the secondary school level or college level an exciting and attractive goal. After a graduate degree a student may wish to meet the challenge of research in mathematics through industrial, educational or governmental institutions. The development of computer science has opened many opportunities to mathematicians interested in computer programming, numerical analysis, and the solution of problems previously inaccessible.
The Department offers a curriculum that is designed to serve the needs of the humanities, the technical background for the related sciences, and those who wish to pursue mathematics as a career.

Students majoring in mathematics must complete at least 25 credit hours in mathematics courses of 300 and 400 level which must include 341 or 351, 451 and 452; 15 hours of physics and two years of foreign languages. A total of at least 45 hours in mathematics with grades of C or better is required. Because of the quantity of mathematical literature written in German, Russian, and French, one of these languages is usually required at the graduate level. Therefore, a mathematics major must either complete two years in one of the above languages or have written approval of the Department Chairman to take another language. Students majoring in mathematics who are not in education should complete physics 241, 242, and 243. Majors are encouraged to take Digital Computation 101, 102, and 103 at the Computer Center during the Sophomore year.

Programs can be selected which will prepare a mathematics major for graduate school, industry or secondary teaching. Suggested mathematics courses are as follows:

3) Education: 300 or 310, 350, 351, 382, 440, 451 and 452.

Courses for a freshman are determined on the basis of the student’s achievement in high school and on the college entrance examinations. Advanced placement of students is encouraged. Freshmen may, at the discretion of the department, enroll in 151 instead of 111, 241 instead of 151 and 191.

111-112-113. Fundamental Mathematics. A one year terminal course. Logic in mathematics and science, the number concept and number system, arithmetic, the logic of algebra, exponents and logarithms, definitions and use of trigonometric functions, introduction to analytic geometry, various geometries, some classical problems. Prerequisite: One year of high school algebra. 9 hours.

151. Elementary Functions. Sets, numbers, basic theorems, extension of the logic of algebra, functions and their graphical representation, linear and quadratic functions, inverse functions, determinants, permutations, combinations, binomial theorem, mathematical induction, exponential and logarithmic functions, trigonometric functions, circular functions, complex numbers. Prerequisite: 2½ units of high school mathematics. 5 hours.

152. Analytical Geometry. Straight lines, conics, translation and rotation of axes, higher plane curves, parametric equations, polar coordinates, oblique
coordinates, space curves and surfaces. Prerequisite: Mathematics 151 or equivalent preparation. \textit{5 hours.}

182. \textbf{Mathematics of Finance}. The mathematical tools of business; simple and compound interest, discounts, installment buying, depreciation, bonds, amortization, sinking funds, annuities, life insurance. Required of business administration and secretarial students. Prerequisite: Mathematics 151 or equivalent. \textit{3 hours.}

183. \textbf{Elementary Statistics}. Concepts and practices commonly used in statistical problems of business, economics, education, and social welfare; testing hypotheses and estimation, chi-square test, analyses of variance, mean, correlation, methods of sampling. Prerequisite: Mathematics 151. \textit{3 hours.}

191. \textbf{Finite Mathematics}. Compound statements, sets, partitions and counting, discrete probability theory, topics in finance. Honors course for students in Economics Business Administration, Biology and Social Sciences. Prerequisite: 2½ units of high school mathematics and/or high admission test scores. 191, 192 and 193 satisfies the Liberal Arts graduation requirements in mathematics. \textit{5 hours.}

192. \textbf{Introductory Calculus}. Systems of numbers, real plane as a Cartesian product, subsets of the Euclidean plane, functions and mapping, limits, derivative, definite integral, partial derivatives, applications to Social and Life Sciences. Prerequisite: Mathematics 191. \textit{5 hours.}

193. \textbf{Probability and Statistics}: Random variables, expectation, mean, variance, standard deviation, law of large numbers, infinite sample space, moment generating functions, density and distribution functions, statistical inference. Prerequisite: Mathematics 192. \textit{5 hours.}

241-242-243. \textbf{Calculus and Analytical Geometry}. This sequence is for students in the four-year engineering program and for advanced placement of freshmen in the physical sciences. Mathematics 243 should be followed by 341. \textit{15 hours.}

153-251-252. \textbf{Calculus}. Functions, limits, continuity, differentiation and integration of algebraic functions, applications, area and volume, centroids, moments of inertia, arc length, differentiation and integration of transcendental functions, applications, and integration by standard forms; sequences, infinite series, Taylor's formula with remainder, partial derivatives and multiple integrals. Prerequisite: 152. \textit{15 hours.}
300. Analytic Geometry of Space. Theory of matrices and determinants, systems of linear equations of curves and surfaces, transformations of coordinates, classification of quadric surfaces. Prerequisite: Mathematics 252 or 341. 4 hours. Performs its logic. Prerequisite: Mathematics 252 or 341. 4 hours.

305. Electronic Computer Concepts. Nondecimal systems, Boolean algebra, introduction to several computer languages, familiarization with several types and makes of computers, effort being made to show the student how the computer performs its logic. Prerequisite: Mathematics 252 or 341. 4 hours.

310. College Geometry. Points, lines, and circles related to a triangle, vector geometry, centers, harmonic properties, inversion, projection, introduction to non-Euclidean geometry. Prerequisite: Mathematics 252 or 341. 4 hours.

320. History of Mathematics. The origin and growth of mathematical concepts, with emphasis on the development of ideas but with personal glimpses of some of the men who made major contributions. Prerequisite: Mathematics 252 or 341. 3 hours.

330. Spherical Astronomy. A lecture and problems course beginning with the three fundamental formulae of Spherical Astronomy and proceeding to the celestial sphere, a description of the meridian circle, the measurement of time, the rotating earth as the standard time keeper, solar and sidereal time, planetary motions, and a short account of astronomical navigation. Prerequisite: Mathematics 241 or 251. 3 hours.


350. Linear Algebra. Vector spaces, linear mappings, linear equalities, matrices, linear inequalities, convex sets, inner product, determinates, quadratic forms, eigenvalues, computer applications. Prerequisite: Calculus. 4 hours.


352. Differential Equations II. Fourier series, finite differences, Laplace transforms, partial differential equations. Bessel functions and Legendre polynomials. Prerequisite: Mathematics 341 or 351. 5 hours.
353. **Vector and Complex Calculus.** Vector calculus, complex calculus, analytic functions, infinite series over the complex plane, theory of residues, conformal mapping. Prerequisite: Mathematics 341 or 351. 5 hours.

382. **Advanced Statistics.** Fundamental statistical aspects such as variability, multiple correlation, measures of functions of distribution, control charts, tests for significance, regression analysis, analysis of variance, probability, sampling. Prerequisite: Mathematics 252 or 341. 5 hours.

405. **Numerical Analysis.** Finite differences, interpolation, polynomial expansions, iterative methods of solving equations, determinates, matrices, eigenvalues, integration formulas, numerical solution of differential equations. Solution of many problems on a digital computer. Prerequisite: Mathematics 341 or 351 and some Fortran Programming experience. 4 hours.

440. **Special Problems.** Independent study in selected topics. By arrangement. 1-3 hours.

443. **Introduction to Topology.** Intrinsic qualitative properties of sets of points. Topologies, topological spaces, neighborhoods, cluster points, homeomorphisms, connected spaces, compactness, metric spaces. Prerequisite: Mathematics 252 or 341. 3 hours.

451. **Introduction to Modern Algebra.** Rings, integral domains, the integers, fields, the rational numbers, the real numbers, the complex numbers, polynomials, groups, vector spaces, matrices, determinants. Prerequisite: Mathematics 252 or 341. 5 hours.

451-452. **Advanced Calculus.** An intensive study of the concepts of limit and continuity, extended law of the mean, functions of several variables, general theorems of partial differentiation, functional dependence, Jacobians, Lagrange multiplier, transformations, and mappings; point-set theory, theory of integration, Riemann-Stieltjes integrals, uniform convergence, intensive study of infinite series, improper integrals, Fourier series and integrals. Prerequisite: Mathematics 341 or 351. 6 hours.
MUSIC

(DEPARTMENT 114)
PROFESSOR ROIDER (Chairman), ASSISTANT PROFESSORS BYRD, SONNTAG, WEITZ; MR. LASKO, MR. Doudna

REQUIREMENTS FOR DEGREES:

To qualify for a Bachelor of Arts degree in Music, or a Bachelor of Science in Education (Music) degree, a student must complete the requirements established by the University and the Department of Music.

These are in accordance with the published regulations of the National Association of Schools of Music and the State Department of Education. A detailed curriculum is available from the department chairman.

*DEPARTMENTAL REQUIREMENTS:

BACHELOR OF ARTS DEGREE

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Theory</td>
<td>16</td>
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<tr>
<td>Counterpoint, Choral or Instrumental Arranging</td>
<td>3</td>
</tr>
<tr>
<td>History of Music</td>
<td>9</td>
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<tr>
<td>Applied Music</td>
<td>36</td>
</tr>
<tr>
<td>Conducting</td>
<td>4</td>
</tr>
<tr>
<td>Participation in a performing group</td>
<td>6</td>
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<tr>
<td>Senior Recital</td>
<td>74</td>
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BACHELOR OF SCIENCE IN EDUCATION

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Theory</td>
<td>16</td>
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<td>Counterpoint, Choral or Instrumental Arranging</td>
<td>3</td>
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<tr>
<td>History of Music</td>
<td>6</td>
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<tr>
<td>Applied Music</td>
<td>18</td>
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<tr>
<td>Conducting</td>
<td>4</td>
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<tr>
<td>Class Voice</td>
<td>2</td>
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<td>Functional Piano</td>
<td>2</td>
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<tr>
<td>Teaching of Instruments</td>
<td>6</td>
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<tr>
<td>Music Teaching Methods</td>
<td>9</td>
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<td>Participation in a performing group</td>
<td>9</td>
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*(Required courses in Education, including Student Teaching are listed in the Department of Education section of the catalog.)*
APPLIED MUSIC

FEES:

Students who register for private instruction in applied music pay $25 per quarter hour credit—one lesson per week.

Auditions are held at the beginning of each quarter whereby any student majoring in music is eligible for an Applied Music scholarship covering the cost of the applied music fee. These may be renewed each quarter upon audition.

A limited practice room schedule is available to students not taking applied music lessons but who wish to continue their music practice. Practice rooms are available only under the advisement of the department chairman. A fee of $10 per quarter per hour for organ, and $5 per quarter per hour for piano is charged for such use.

020. VOICE. Correct physical and mental poise, the principles of breathing, proper diction and articulation; presentation of vocal works before an audience through recital and student assembly. 1-2 hours per quarter.

021. PIANO. Individual instruction in piano playing; use of the works of the masters through all grades; recitals and public appearances to gain poise and develop self-assurance. 1-2 hours per quarter.

022. ORGAN. Ability in piano playing sufficient to warrant organ instruction is required. Preparation for church and concert work including the best organ literature and the principles of modulation, accompaniment, and improvisation. 1-2 hours per quarter.

023. STRINGS. 1-2 hours per quarter.

024. WOODWINDS. 1-2 hours per quarter.

025. BRASSES. 1-2 hours per quarter.

026. PERCUSSION. The fundamentals; technical facility; intonation, tone production, and style necessary to artistic performance and interpretation. 1-2 hours per quarter.

035. CHORUS-CHOIR. Students of any college of Ohio Northern University interested in singing in the Chorus-Choir have the opportunity to try out for this organization. Music of all types, accompanied and a cappella, is used throughout the year. Sacred and secular music for concerts at the University and outside the community are a part of the program. Up to 6 hours credit are permitted for non-music majors. 1 hour per quarter.
040. **Band.** All University students who play band instruments are given the opportunity to play in the University Band. The Band appears in concert as well as at many school and community functions. Band members may participate in woodwind and brass ensembles. Up to 6 hours credit are permitted for non-music majors. *1 hour per quarter.*

045. **Orchestra.** All University students who play orchestral instruments are given the opportunity to participate in the Lima Symphony Orchestra. Enrollment is subject to audition. Up to 6 hours credit are permitted for non-music majors. *1 hour per quarter.*

050. **Vocal Ensemble.** Enrollment by permission of instructor. *1 hour per quarter up to 6 hours.*

055. **Instrumental Ensemble.** Enrollment by permission of instructor. *1 hour per quarter up to 6 hours."

**Courses in Music**

101-102-103. **Theory.** The singing, reading, and writing of scales, intervals, triads and simple part-writing from melodies and figured bases. Also seventh chords, modulation and the non-harmonic tones. Original work includes the hymn tune and simple two and three part song-forms. *12 hours.*

111. **Music for the Elementary Classroom Teacher (Primary).** Music activities, music materials, and literature, unit planning and teaching methods and skills for the elementary classroom teacher—grades 1-3 including kindergarten; the use of the auto-harp, melody instruments, records, and creativity. *3 hours.*

112. **Music for the Elementary Classroom Teacher (Intermediate).** Music activities, music materials, and literature, unit planning and teaching methods and skills for the classroom teacher—grades 4-6. *3 hours.*

200. **The Study of Music.** Listening experience in material of the seventeenth, eighteenth and early nineteenth centuries, and from the Romantic period to the present time; musical analysis and score reading; tools necessary to enjoyment of good musical literature. Meets the Liberal Arts music requirement. *3 hours.*

211. **Theory.** Altered chords, non-harmonic tones, chromatics, and advanced modulation. Analytical technique of music compositions and the study of Musical Form from the motive and song-form to the sonata and contrapuntal forms. *4 hours.*
301-302. **Conducting.** Courses in principles of conducting, concluding with conducting choral, band and orchestra scores. 4 hours.

311 or Ed. 350. **Primary Music Methods** (Music Education Majors). The study of music techniques, teaching procedures, and the use of materials in the primary grades; designed for music teachers and supervisors. 3 hours.

312 or Ed. 360. **Intermediate Music Methods** (Music Education Majors). Music techniques, teaching procedures, and the use of materials and instruments in the intermediate grades; for music teachers and supervisors. 3 hours.

313 or Ed. 450. **Junior and Senior High School Methods** (Music Education Majors). Music techniques, teaching procedures and the use of materials and instruments in the junior and senior high school; band, orchestra, and chorus organization; festival and public performances. 3 hours.

320. **Class Voice.** 2 hours.

330. **Functional Piano.** Group instruction in the piano literature appropriate to the primary and secondary school situations; improvisation, the extemporaneous harmonization of melodies and experience in vocal and instrumental accompaniment are included. 2 hours.

340. **Instrumentation and Orchestration.** To give the public school music instructor a knowledge of the instruments of the orchestra and band, and the arrangements of music for complete school orchestras and bands. 1-3 hours.

350. **Counterpoint.** Courses designed to give the public school music instructor in the vocal field of music the technique of contrapuntal writing. 1-3 hours.

351-352-353. **History of Music.** These courses deal with the origin and development of music, studied from an appreciative basis. 9 hours.

360. **Choral Arranging.** The arranging of music for the school choir, glee clubs, and vocal organizations. 3 hours.

440. **Special Problems.** Open only to seniors who are majors in music. 1-3 hours.

441. **Teaching of Brass and Percussion Instruments.** 2 hours.

442. **Teaching of Woodwind Instruments.** 2 hours.
443. **Teaching of Stringed Instruments. 2 hours.**
Courses designed to give the prospective teacher a general knowledge of the playing technique of the instruments in the orchestra and band.

480 or Ed. 480. **Supervised Teaching in Elementary, Junior, and Senior High School. 12 hours.**

**Philosophy and Religion**

(Department 115)

Professor Tinsler (Chairman); Associate Professor Hinderliter; Assistant Professors Hodges, Smith, Vannorsdall.

Field of Concentration (Interdisciplinary major)

A field of concentration of 52 hours, exclusive of the core course, 231-232-233, constitutes a major in philosophy and religion, and shall include the following courses: Bible History, Rel. 254-255-256; Logic and Introduction to Philosophy, Philosophy 234-235-236; St. Paul and Church History 351-352-353; and the History of Philosophy, Philosophy 311, 312, 313, together with General Psychology and a basic course in Sociology, Problems in Religion 450, or Problems in Philosophy 430, in the Senior year; plus electives in Philosophy or Religion or both to total at least 52 hours.

231-232-233. **Historical Study of Philosophy and Religion.** Religion and philosophy as a developing body of convictions by which man has attempted, in every age, to solve the problems and mysteries of life. A one-year unit of study designed and recommended for meeting the philosophy-religion requirements for graduation. 9 hours.

**Philosophy**

In the Department of Philosophy a search is made for a comprehensive view of the universe and man’s place in it. Assumptions are examined and conclusions evaluated. The goal is the achievement of principles of sound reasoning in connection with the living issues of both personal and social life.

234. **Logic.** The principles and methods of reasoning. Examines the relations of truth and validity, the uses of language, the sources of fallacies, and the structure of deductive arguments. 3 hours.

235-236. **Introduction to Philosophy.** A two quarter course initiating the student into the perennial problems of philosophy by means of firsthand acquaintance with the writings of philosophers through the ages. 6 hours.
331, 332, 333. **The History of Western Philosophy.** 9 hours.

331. **The Classical Period of Greek and Roman Philosophers.**


431. **Ethics.** A critical study of the various moral theories developed in the Western world in its attempt to formulate a standard for moral behavior applicable to individuals and social groups. Prerequisite: A year of Philosophy 231-232-233 or 234-235-236. 3 hours.

432. **American Philosophy.** Reading and discussion of selected writings of modern American philosophers, including James, Dewey, Santayana, Whitehead and contemporary philosophers. Prerequisite: A year of Philosophy 231-232-233 or 234-235-236. 3 hours.

433. **Philosophy of History.** A study of the principles, methods and theories used by historians in their writing and interpretation of history. Prerequisite: A year of Philosophy 231-232-233 or 234-235-236. 3 hours.

430. **Problems in Philosophy.** Research or special projects for seniors prepared to do special work in philosophy. By arrangement. Prerequisite: 36 or more hours in the department before beginning "Problems. 1-3 hours.

**Religion**

Believing that anything which existed in history can be studied historically, the historical (or objective) approach to the study of religion is used, presenting the figures of Bible history and religion as real people in real life situations, facing real problems and finding real solutions through their religious insights. The courses are neither sectarian nor dogmatic but aim to give the student the factual background for his own interpretation of a vital faith.

251. **Bible Customs and Manners.** The social, political and religious customs and folkways of the peoples of the Near East; a background and local color for understanding of the Bible. 3 hours.

252. **Introduction to Religion.** Religion as the vital experience and growing conviction of real people facing real problems in real life situations, with a careful examination of the contrast between the religion of primitive and of advanced cultures. 3 hours.
253. **The Message of Jesus Christ.** The teachings of Jesus Christ, as recorded in the New Testament Gospels; their personal and social application to everyday life. 3 hours.

254-255-256. **Bible History.** The history of the Hebrew and early Christian peoples of Old and New Testament times, with special reference to the scriptural record, and in relation to the cultural, political and religious influence of their Near East neighbors. The fall quarter traces this history from early times to the reign of Solomon; the winter quarter, from the period of the Divided Kingdom through the Exile and Restoration with special attention to the prophets; the spring quarter, from the Maccabean Period through the times in which Jesus lived and taught, the work and writings of St. Paul, the beginnings of the Early Church, and the writing and selection of the New Testament Scriptures. 9 hours.

351. **The Life and Letters of St. Paul.** The development of the early Church and the relation of St. Paul to this work as revealed in the Book of Acts and in the Letters of Paul. Prerequisite: One year of Religion. 3 hours.

352. **Church History Through the Reformation.** The Church in history, with consideration of individuals, ideologies, and events from the Apostolic Age to the Reformation. Prerequisite: As in 351. 3 hours.

353. **Church History from the Reformation to the Present.** A continuation of 352, with emphasis on Christianity in America today. Prerequisite: As in 351. 3 hours.

356. **Comparative Christianity.** Roman Catholicism, Greek Orthodoxy, and the chief denominations of Protestantism; their key concepts, chief emphases and doctrines which distinguish them. Prerequisite: A year's course in religion or equivalent. 3 hours.

357. **Introduction to Religious Education.** For voluntary lay workers in the local church, dealing with the modern church-school movement; the work of the local-church commission on education; home and community relationships; agencies and councils; and the problem of administration, supervision and promotion of the Sunday, week-day and vacation church schools. Prerequisite: A one-year course in religion or equivalent. 3 hours.

359. **Churchmanship.** The Christian Church in modern life, its historical purpose and functions, organizations and agencies, activities, missionary outreach, the ecumenical movement, social concerns, etc. Prerequisite: As in 357. 3 hours.
452. PHILOSOPHY OF RELIGION. The philosophy underlying such religious concepts as God, soul, freedom, prayer, destiny, evil, and immortality. Credit applicable to either philosophy or religion. Prerequisite: 231-232-233 or a one-year course in philosophy or religion, preferably both. 3 hours.

453. CHRISTIAN ETHICS. Theories of value in the field of conduct which have been recognized as “Christian ethics,” relating to the individual, the family, society, economics, the state, international relations, war and the like. Prerequisite: Same as 452. 3 hours.

454. WORLD RELIGIONS. A study of the major living religions of the world. Prerequisite: Same as 452. 3 hours.

450. PROBLEMS IN RELIGION. Research or special projects for seniors prepared to do special work in the field of religion. By arrangement. 1-3 hours.

HEALTH AND PHYSICAL EDUCATION

(DEPARTMENT 143)

PROFESSOR LAMB, ASSOCIATE PROFESSOR ENGLISH (Chairman), ASSISTANT PROFESSORS ROBERSON, BANKS, MICHAEL; MRS. LUDWIG, MR. MILLER, MISS KERR

Some form of physical activity is required of all students during their first two years in the University. The nature and amount of work to be taken depends upon the physical condition as revealed by an examination and by efficiency tests given at the beginning of the school year. A program of elective and required activities is provided, which aims to achieve the highest degree of individual and social efficiency both during and after college life.

The elective courses are both theoretical and practical. A strong intramural sports program is designed to provide activity for nearly every student on the campus.

Some variation in sequence is permitted those students who have teaching fields in mathematics, biology, science, industrial arts. These four teaching fields along with driver education are the best for majors of health & physical education, according to our experience.

Detailed curriculum for majors can be obtained from the department chairman.

In as much as requirements are high for State Certification, it is recommended that as many electives as possible be taken in fields outside its department.
REQUIRED COURSES

Physical Education two hours a week. One credit each quarter for the first six quarters. Must be completed prior to senior status in Liberal Arts.

First year. This work is given both out-of-doors and in the gymnasium. It is systematically graded and arranged to fit the needs and interest of the individual. Corrective work for those who need it, and the fundamentals of natural gymnastics and games are stressed.

Second year. A continuation of the first year program, with greater emphasis on play activities.

001-002-003. Physical Education Men. Gymnasium and outdoor classes in season, natural gymnastics, informal play.

004-005-006. Physical Education Women. A course in natural gymnastics including games and sports in season, dancing.


Co-Ed P.E. 010, 040 and 050 have a prerequisite of three (3) quarters of regular P.E. Service Classes.

Intramural Sports. An intramural program offers activity for each university student. The following sports are offered: football, basketball, free throwing, baseball, speedball, handball, playground ball, volleyball, tennis, wrestling, boxing, track, touch football, golf, and horseshoes.

PROFESSIONAL CURRICULUM FOR TEACHERS

For students who wish to specialize in the field of health and physical education a four-year professional curriculum is offered leading to the degree of Bachelor of Science in Education and to a special state four-year Provisional Certificate.

In addition to the requirements listed below each major in the health and physical education program must be affiliated in some manner with one of the major sports in the inter-collegiate program.
101-102-103. **Physical Education for Majors.** 1 hour each.

201-202-203. **Physical Education for Majors.** Courses 101 to 203 are required of all students majoring or minoring in physical education in place of Courses 001 to 003. Activities in season, including games, stunts, tumbling, clogging, folk and character dancing, natural dancing, and combat activities for men. These courses apply toward the physical education major. 1 hour each.

110. **Personal and General Hygiene.** The various phases of personal hygiene and health from the individual aspect; preventive measures. Each quarter. 3 hours.

112. **First Aid and Safety Education.** Lectures discussion and practice in the giving of first aid in emergencies. The American Red Cross First Aid Certificate may be obtained by students who pass an examination. 3 hours.

121. **Health Education.** The relation of hygiene to home and community life; transmission and control of diseases. 3 hours.

122. **Health Education.** The health program of the public schools, and the teaching of habits, attitudes and knowledge conducive to good health. 3 hours.

123. **Health Education.** For the special teacher and supervisor of physical education; teachers' health; health problems arising in a school system; methods and materials for teaching health and evaluation. 3 hours.

133. **Theory and Practice of Play and Games.** The need, purpose, and function of play in education; activities adaptable to various levels of the elementary and secondary schools. 3 hours.

213. **Advanced First Aid.** Upon satisfactory completion of this course the Advanced First Aid Certificate and Instructor Training Certificate will be awarded. Prerequisite: First Aid and Safety Education 112. 3 hours.

223. **Body Mechanics.** The general body mechanics of the human organism; the activities of the physical education program in their relation to coordination and the proper body mechanics. Prerequisite: Physiology and Anatomy 331 and 332. 3 hours.

301-302-303. **Principles, Methods, Organization and Administration of Physical Education.** Lectures, demonstrations, and practice. Physical education and recreation from the standpoint of general education; the teaching of fundamental skills of tumbling and stunts, basketball, indoor baseball, speedball, volleyball, handball. Class, three hours; practice, two hours. 5 hours.
321. **Methods in Coaching Football.** Equipment, fundamentals of the game, kicking, passing, handling the ball, tackling, blocking; individual position play; offensive and defensive formations; strategy and generalship. 3 hours.

321. **Methods in Coaching for Women.** To prepare students in physical education to coach Athletics in secondary schools; technique, basic principles, teamplay and methods for instruction of hockey, archery, volleyball, speedball. 3 hours.

322. **Methods in Coaching Basketball.** Men—the fundamentals, passing, shooting, dribbling, feinting, and pivoting; styles of offense and defense, equipment; conditioning; the handling of a team in games. Lectures, demonstration and practice. Women—basketball, badminton, trampoline, tumbling and bowling. 3 hours.

323. **Methods in Coaching Baseball and Track.** Pitching, catching, batting, fielding, baserunning, individual position and team play in baseball; methods and forms for all of the events in track and field. Lectures, reports, demonstrations, and practice. Women—softball, tennis, track, field sports and golf. 3 hours.

*331-332-333. Advanced Coaching Practice.* To give students who have had Courses 321, 322 and 323 an opportunity to do actual coaching under supervision, in all sports in season. Hours arranged. 3–9 hours.

*341. Football Officiating.* This course includes the study of the football rules from the standpoint of the player, coach and official. 3 hours.

*342. Basketball Officiating.* Same description as Course 341 except it applies to basketball officiating. 3 hours.

*343. Athletic Training and Conditioning.* To meet the need of the high school coach; training procedures and conditioning of athletic teams for all sports; treatment of athletic injuries. 3 hours.

402. **Adaptive and Corrective Physical Education.** To present to all who are concerned with the education of the handicapped, a method of teaching that will motivate the atypical student to improve not only his physical condition, but also his outlook on life. 3 hours.

*440. Problems in Physical Education.* Specific problems in physical and health education open to properly qualified students. Time to be arranged. 1–3 hours.

480. **Student Teaching.** See Education 480. 9 hours.
PHYSICS

(Department 124)

Professors Abele (Chairman), Benedict; Assistant Professors Weimer, Messick; Mr. Roll

The primary aim of the physics department is to offer courses that will stimulate scientific thought, train the student to reason from fundamental experimental fact, further the student's desire to continue scientific investigation, and meet the needs of those students who are interested in physics for its cultural or its vocational value.

The department aims to give a training sufficiently broad to enable the student to appreciate the physics of scientific articles, to teach physics in the public school, to apply physics in engineering, medicine and other sciences, and to pursue graduate work.

The physics major must include at least two hours each of 310, 320, 330, 340; mathematics through 351 or 341; and general chemistry should be completed.

The basic curriculum for concentration in physics should be entered upon during the freshman year, and can be obtained from the department chairman.

210. Physics. A lecture and demonstration course of fundamental physical laws in mechanics, heat, electricity, sound, and light for elementary education majors. Prerequisite: Math. 111, 112 or equivalent. 4 hours.

211. General Physics: Mechanics of Solids and Fluids. 4 hours.

212. General Physics: Sound, Heat and Light. 4 hours.

213. General Physics: Electricity and Magnetism. 4 hours.

These courses are for pre-medical, pre-dental, pre-pharmacy and secondary education students. Three class periods and two hours of laboratory. 211 should precede 212 and 213. Prerequisite: Mathematics 151, 152.

231. Physics: Mechanics of Solids and Fluids. 5 hours.

232. Physics: Sound, Heat and Light. 5 hours.

233. Physics: Electricity and Magnetism. 5 hours.

Courses for engineers and physical science majors. Four class periods and two hours of laboratory. 231 should precede 232 and 233. Prerequisite: Mathematics 251 or 241 taken concurrently.
250. **Astronomy.** Study of celestial bodies including distance, motion, size, distribution of planets, stars, extragalactic nebulae, and modern theories regarding them. Prerequisite: Physics 210 or equivalent. 3 hours.

302. **Electronics.** Electron ballistics, thermionic emission, vacuum tube and transistor characteristics, rectifiers, amplifiers, oscillators, modulators, demodulators, and electron tube and transistor instruments. Four class periods and two hours of laboratory. Prerequisite: Calculus 253 and Physics 233. 5 hours.

303. **Modern Physics.** The concepts involved in quantum mechanics, relativity and statistical mechanics are introduced. Applications of the above fields are presented to atomic physics, macrophysics and astrophysics. Prerequisites: Math 351 or 341 and Physics 233. 3 hours.

310. **Theory and Advanced Laboratory: Mechanics.** 1-6 hours.

320. **Theory and Advanced Laboratory: Light, Heat, Sound.** 1-6 hours.

330. **Theory and Advanced Laboratory: Electricity.** 1-6 hours.

340. **Theory and Advanced Lab: Nuclear Physics and Solid State.** Credit is given in courses 310, 320, 330 and 340 according to the work done. Offered every quarter. Prerequisite: Physics one year. 1-6 hours.

401. **Analytical Mechanics.** The principles of mechanics as applied to a study of dynamics of particles and bodies. Prerequisites: Physics 233 and Mathematics 351 and 341. 5 hours.

402. **Electricity and Magnetism.** Electric and magnetic fields, dielectrics, inductance, capacitance, direct and alternating current circuits. Prerequisites: Physics 233 and Mathematics 351. 5 hours.


413. **Solid State.** A lecture and problems course in the structure of solids and their phenomena. Quantum and statistical mechanics concepts are introduced to develop theories of internal stress and strain in crystals, conductivity of electricity in metals, semiconductors and superconductors, magnetism, the thermal properties of solids and imperfections in solids. Prerequisite: Modern Physics or permission of instructor. 3 hours.
423. **Light.** The laws of physical and geometric optics; optical instruments, reflection, refraction, absorption, dispersion, interference, and polarization. A study of lenses, prisms, mirrors, gratings, and instruments used in the study of light. Prerequisite: Physics 233. 5 hours.

440. **Special Problems in Physics.** Independent study or research in special topics in physics. By arrangement any quarter. 1-3 hours.

**Sociology and Psychology**

(Department 133)

Professor Markle (Chairman), Assistant Professors Crider, Cohoe; Mr. Seitz, Mrs. Crider

The courses of this department give students an understanding of human relationships, institutions, and social processes; familiarize them with the nature and causes of social problems; acquaint them with the facts and laws of behavior and mental life, primarily of man; enable them to develop wholesome personalities and to make adequate social adjustments; and give them deeper insight into the requirements of intelligent citizenship and of useful participation in community life.

In order to complete a field of concentration in the area of Social Welfare, the student must complete the following courses:

**I. Humanities**

Liberal Arts Orientation 1 hour
151-2-3 English Composition 9 hours
201-2-3 English Literature 9 hours

or

211-2-3 American Literature
A foreign language 24 hours
231-2-3 Historical Study of P.&R. 9 hours
271 Public Speaking I 3 hours
200 Introduction to Art 3 hours
200 Introduction to Music or
one of the cultural development courses 3 hours

**II. Natural Sciences**

111-2-3 Fundamental Mathematics 9 hours
111-2-3 General Biology 12 hours
III. SOCIAL SCIENCES

201-2-3 American Government 9 hours
211 General Psychology 5 hours
351 Social Psychology 5 hours
201-2-3 Marriage and the Family 9 hours
321-323 Criminology and Juvenile Del. 10 hours
341 Introduction to Social Welfare 3 hours
342 Social Welfare Needs and Resources 3 hours
343 Social Work Methods 3 hours
441-442 Social Welfare Investigation 6 hours
443 Social Field Work Observation and Orientation 2-5 hours
433 Human Growth and Development 3 hours
444 Domestic Law 3 hours

In order to complete a major in sociology, the student must complete forty-five hours in that field. In addition, fifteen hours must be completed within the Division of Social Sciences, in departments other than the Department of Sociology.

In order to complete a major in psychology, the student must complete forty-five hours in that field. Psychology majors must complete one year of general biology.

PSYCHOLOGY

211. General Psychology. Psychological facts and principles; human experience and behavior. Open to qualified freshmen with the consent of the instructor. Formerly 201. 5 hours.

223. Child Development. Characteristics of the child at different levels of maturity; physical, mental and emotional growth; growth and organization of meanings; control of social and ethical behavior; development of personality. Prerequisite: Psychology 211. 3 hours.

311. Psychology of Personality. The nature and development of personality, and methods of adjustment; discussion of the various theoretical approaches to the psychology of personality. Prerequisite 211. 5 hours.

313. Educational Psychology. A study of the learning process and the conditions that promote learning. Prerequisite: Psychology 211. 3 hours.

332. Applied Psychology. The application of psychological principles to problems of modern life; clinical practice; personnel work; home life; education; industry; business law and criminology; medicine and social reform. Prerequisite: Psychology 211. 5 hours.
351. **Social Psychology.** Social behavior and social adjustment; the effect of the social environment upon the development of personality; the relation of social and psychological laws to problems of the community. Prerequisite: Psychology 211. 5 hours.

353. **Psychology of Business and Industry.** The principles and applications of psychology as used in business, industry and personnel work. Prerequisite: Psychology 211. 3 hours.

411. **Counseling and Guidance.** The basic psychological principles involved in educational, vocational, and personnel counseling; their application to a sound guidance program. Prerequisite: Psychology 211. 5 hours.

421. **Abnormal Psychology.** Behavior pathology; the neuroses and psychoses; various theoretical approaches to the problems of etiology. Prerequisite: Psychology 211. 5 hours.

422. **Psychology of the Slow Learner and Retarded Child.** An analysis of the psychological problems of the slow learner and the retarded child with emphasis on problems of etiology, classification, and programs of adjustment.

423. **Psychology of the Exceptional Child.** The classification of the non-typical child; the use of the school and other sources for meeting his needs. Prerequisite: Psychology 211. 3 hours.

424. **Psychology of the Gifted Child.** An analysis of the psychological problems of the gifted child. Prerequisite: Psychology 211. 3 hours.

431. **Introduction to Experimental Psychology.** A study of scientific methodology, terminology, and reporting with accompanying lectures on the historical development of the field. Prerequisite: Psychology 211. 3 hours.

432. **History and Systems of Psychology.** The European antecedents of modern day psychology and its transmission to and development in the United States. Emphasis on the schools—Structuralism, Functionalism, Behaviorism, etc. Prerequisite: Psychology 211. 3 hours.

433. **Human Growth and Development.** Human development from conception to old age. Emphasis upon the physical, emotional and personality development of the individual. Prerequisite: Psychology 211. 3 hours.

440. **Psychological Problems.** Minor investigation. Open only to qualified seniors. By arrangement. 1-3 hours.

**Sociology**

201. **Courtship and Marriage.** A practical course in the study of adjustment in courtship, preparation for marriage and for family living. 3 hours.

203. Family Relationships. The effects of early family relationships and the individual’s day by day experiences upon the child in American society. 3 hours.

241. General Sociology. A study of the phenomena of human relations, including the nature and import of sociology, socialization, social ideals and social control. 5 hours.


301. Social Pathology. Social pathology, as it concerns our own society, including the study of such problems as poverty, crime, the family, public health, etc. 5 hours.

321. Criminology. The problems of crime and criminals; the factors conducive to the making of criminals; a suggested program of treatment and prevention; penal institutions and the history of punishment. 5 hours. (1967-68)

323. Juvenile Delinquency. Characteristics of delinquents, juvenile court procedures, correctional training in institutions, plans and programs for the prevention of delinquency. 5 hours. (1967-68)

331. The Culture of Early Man (Cultural Anthropology). Preliterate culture, its relation to geography, biology and psychology; primitive religion, family patterns, and cultural variations. 5 hours.

341. Introduction to Social Welfare. The historical development of health and welfare services, public and voluntary, from English and early American background to the present. 3 hours.

342. Social Welfare Needs and Resources. The programs of governmental, private and voluntary agencies, in meeting the problems of the aged, unemployed, disabled, handicapped, children and other special groups. 3 hours.

343. Social Work Methods. Introduction to the basic processes used in social work practices; social case work, social group work, and intergroup or community work. 3 hours.

403. Race Relations. A study of the phenomena which arise when groups of people who differ racially or culturally come into contact with one another. 5 hours. (1967-68)
413. **Industrial Sociology.** The social organization of industry and human relations in the work plant. Conflict and cooperation in the work group and the relation between the work group and the community. 3 hours.

414. **Rural-Urban Sociology.** A comparative study of the organization, social processes, problems, and interrelationships of rural and urban communities. 5 hours.

421. **Public Opinion and Propaganda.** An analysis of the nature and sources of contemporary public opinion and the nature, extent, and direction of propaganda in contemporary society. 3 hours.

422. **Marriage and Family Counseling.** Premarital and marital counseling; emphasis upon role playing in a counseling situation. Open only to students with the approval of the instructor. Prerequisite: Sociology 201-202. 5 hours.

430. **Conference Leadership in Human Relations.** To aid participants in better use of conference leading techniques; basic information regarding techniques; an opportunity to lead supervised practice discussion. 3 hours.

440. **Social Problems.** Minor investigation. Open only to qualified seniors by arrangement. 1-3 hours.

441-442. **Social Welfare Investigation.** Social welfare investigation and methods of research and their application to the analysis of social phenomena. Prerequisite: 341, 342, 343. 6 hours.

443. **Social Field Work Observation and Orientation.** To enable qualified students to observe and participate in social work programs under the supervision of professional workers. Prerequisite. 441-42. 2-5 hours.

444. **Domestic Law (See Law School Course 470).** 3 hours.
College Of Engineering

LAWRENCE H. ARCHER, DEAN

ACADEMIC RECOGNITION

The Engineers' Council for Professional Development, the only official accrediting agency for engineering curricula, has accredited all of the programs in the College of Engineering. Each department, Civil, Electrical, and Mechanical Engineering, enjoys this distinction. Membership by the College is held in the American Society for Engineering Education. The Ohio State Board of Registration for Professional Engineers and Surveyors lists Ohio Northern University as a recognized engineering school.

PURPOSE

Basically, the engineering student learns how to think in a logical sequence, subject to the facts involved. In keeping with the objectives of Ohio Northern University, it is the aim of the College of Engineering to develop the whole individual. We purpose to have each student attain the highest undergraduate proficiency in subject matter basic to all engineering, in the essentials of his chosen branch of the profession, and in the areas of living, to enable him to become successful and creative in his profession and effective as a citizen.

HISTORY

During the eighty-five years of its existence the College of Engineering has had more than twenty-five hundred graduates. The Civil Engineering Department had its first class in 1882; Electrical Engineering, in 1898; and Mechanical Engineering, in 1904.

The student has always been treated as an individual. Class size has been kept at a minimum. Close faculty-student relationship is still maintained today.

ADMISSION

As early as the junior year of high school the student interested in engineering is encouraged to obtain the advice of the Dean of the College of Engineering and to request appropriate information and application materials from the Office of Admissions, Ohio Northern University. Each applicant for admission should read carefully the section of this catalog entitled ADMISSION TO THE UNI-
VERSITY (see Index). Early application is advisable. Candidates of good moral character may apply for admission upon one of the following plans:

A. **High School or Academy Graduates**, or the equivalent. For the regular program each applicant must have course credits as follows: English, 4 years; mathematics, 4 years; science, 2 years. It is recommended that applicants have two years of foreign language. The normal college preparatory program includes the necessary courses.

In mathematics, two years should be in algebra, one in plane geometry, one-half in solid geometry, and one-half in trigonometry or the equivalent thereof. The sciences must include physics, and should include chemistry.

Students who meet the general university admission standard, but are found to be deficient in mathematics, English, reading, and/or physics, will be required to make up the deficiency. This will take at least one summer session in addition to the regular four-year program or may require a fifth year.

B. **Transfer Students.** Students from other accredited colleges and universities in good academic standing and entitled to honorable dismissal may be admitted with advanced standing. Concealment of previous college attendance is cause for revocation of admission. Advance credit from other institutions of higher learning will not be given for more than 162 hours (108 semester hours). The work must be "C" level or better.

C. **Special Student.** Mature persons not candidates for a degree may be admitted as special students if, on consultation, the Dean is satisfied that they have sufficient preparation to pursue the work successfully. Upon successful completion of their work a certificate is awarded indicating the course of study pursued and the amount of work covered.

**LOAD**

The standard load in the College of Engineering is listed under each department term by term. Extra hours based upon scholarship attainments, at least a "B" average, may be permitted by the Dean upon recommendation of the student's adviser and the payment of the extra hour fee. Engineering students are responsible to fulfill the requirements of the current year's catalog as they apply to that year of his course.

**STUDENT ACADEMIC STANDING**

A student is placed on warning once only; occasionally when admitted, otherwise, the first time he fails to attain a 2.0 point average for the quarter. If at any time thereafter he drops below 2.0 either for the quarter or in his accumulative average, he is placed on probation, at which time his load is reduced.
A student may be placed on probation without first having been on warning when circumstances warrant.

A student on probation who falls below 2.0 either for the quarter or in his accumulative average is subject to suspension or dismissal. Suspension implies the possibility of readmission at a later date, generally three quarters passing.

Students on warning are required to have at least monthly consultations with their adviser; students on probation, at least every two weeks.

CLASSIFICATION

The traditional terms of freshman, sophomore, junior, and senior are not used. Engineering education is vertical in nature insofar as most courses are sequential. The level at which the student is studying is far more consequential than the hours accumulated or the years spent in school.

A two digit code is used to classify students. First year students on the five-year program are number 15; second, 25; third, 35; fourth, 45; and fifth, 55. For the four year students the ranks are 24, 34, 44, and 54 respectively. The first digit indicates the level at which the student is studying and the second digit shows the length of the program, i.e., a four-year or a five-year program.

Courses, equivalent thereto, which must be completed before advancing to the next rank classification are shown in the programs for each of the departments in the pages that follow.

GRADUATION AND DEGREES

In addition to meeting specific University and departmental requirements, a minimum of 215 academic hours is required for graduation. The student must have a scholarship rating of at least two quality points for each credit hour scheduled with an accumulative point average of 2.0 in all engineering courses. A student is not permitted to be a candidate for more than one degree at any on time, the Arts-Engineering program excepted.

All degree candidates must spend their last year in residence, taking at least forty-five quarter hours in the 400 level engineering courses for final credit toward graduation.

At graduation engineering students receive the appropriate degree, Bachelor of Science in Civil Engineering, Bachelor of Science in Electrical Engineering, or Bachelor of Science in Mechanical Engineering.

REGISTRATION AS A PROFESSIONAL ENGINEER

Registration by the state as a Professional Engineer, important for professional practice, requires four years of experience after graduation as an engineer.
Full information is given in the first and last years and is available from the Dean of the College of Engineering or from the Secretary of the Board of Registration for Professional Engineers and Surveyors, 21 West Broad Street, Columbus, Ohio 43215.

ENGINEERING BUILDING

The College of Engineering, staff, and faculty are housed in a three story, thirty-eight room brick structure. The building has drafting rooms, design rooms, classrooms and laboratories, including Testing Materials Laboratory, Fluid Mechanics Laboratory, Concrete Laboratory, Soils Laboratory, Steam Laboratory, Internal Combustion Engine Laboratory, Air-Flow Laboratory, A.C. Power Laboratory, D.C. Power Laboratory, Surveying Supply, Senior Design Room, Visual Aid Room, Graphics Laboratory, Machine Shop, Carpenter Shop, Tool Crib, Electronics Laboratory, Analog Computer Room, and Computer Center.

COMPUTER CENTER

Today, with the rapid advancement of science and technology, more and more use is being made of computers by scientists and engineers. Since nearly all firms that employ engineers have access to a computer, the engineer needs an educational background in the use of computers. The establishment of the Computer Center follows the current engineering trend to make equipment available to the undergraduate student.

A course which uses the Computer Center as a laboratory is available to all first year engineering students. The student is his own operator, and does his own work within the Center. The use of the Center is intended to become an integral part of the engineer's education, and is required in other engineering course work.

The Center contains a scientific IBM Digital Computer, a 1622 Card Reader Punch, a 1311 Random Access Disk file, a 1443 Printer, and needed support equipment, all located within the engineering building.

PROFESSIONAL AND TECHNICAL ORGANIZATIONS

All engineering students are expected to participate in the professional society and their technical organization.

The student branch of the Ohio Society of Professional Engineers includes all students of the College of Engineering as their professional organization. Professional standards, professional registration, ethics and the engineer's place
in the community are some of the things inculcated by the student branch of
the Ohio Society of Professional Engineers, and the National Society of Profes-
sional Engineers.

All civil engineering students are eligible for membership in the Ohio
Northern Student Chapter of the American Society of Civil Engineers; activities
of A.S.C.E. round out the student's program. It is affiliated with the Toledo
Section of the American Society of Civil Engineers.

The Institute of Electrical and Electronics Engineers Student Branch is
the technical society of electrical engineers. Topics pertinent to the field of elec-
trical engineering are presented and discussed at their meetings. The student
chapter enjoys a very close association with the Lima Section of the Institute
of Electrical and Electronic Engineers.

The Ohio Northern Student Section of the American Society of Mechanical
Engineers is the technical society that sponsors the discussion of mechanical
engineering and its allied fields. It is affiliated with the Toledo Section of the
American Society of Mechanical Engineers.

Monthly meetings are held by the professional and the three technical groups
on first and third Wednesdays, respectively.

PRE-ENGINEERING CURRICULA

Since the first two years of any particular curriculum in engineering are
practically the same, it is possible to offer pre-engineering in all fields. As soon as
the pre-engineering student decides where he or she will get his or her degree,
the program is varied so that it will conform to the schedule as listed in the
catalog of that institution. All pre-engineering students are enrolled in the College
of Engineering.

ARTS-ENGINEERING CURRICULA

Superior students may qualify to pursue the Arts-Engineering program. The
student is admitted to both the College of Liberal Arts and the College of
Engineering at the start of the planned program. In five academic years two
degrees, Bachelor of Arts in the College of Liberal Arts and Bachelor of Science
in the appropriate branch of engineering in the College of Engineering can be
earned. An advantage of the program is the fact that a student can major in
any subject matter area in liberal arts as well as any branch in engineering.

The superior student will be challenged to understand more fully humanity
and civilization in a scientific and engineering world. Completing this program
will increase the service that he will perform for mankind and he will help
create a much broader image of the engineer in this age.
## Arts-Engineering Program

### First Year (Rank 61)

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<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>English Composition I, II, III</td>
<td>112151-112152-112153</td>
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<tr>
<td>General Chemistry I, II, III</td>
<td>122131-122132-122133</td>
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<tr>
<td>Calculus &amp; Analytical Geometry I, II, III</td>
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<td>Language II (Second Year)</td>
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<td>Social Science</td>
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### Second Year (Rank 62)

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<th>Course</th>
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<tr>
<td>Engineering Physics I, II, III</td>
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<tr>
<td>Fine Arts</td>
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<td>Liberal Arts Major</td>
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<tr>
<td>Digital Computer I, II, III</td>
<td>201101-201102-201103</td>
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R = Recitation, L = Laboratory, C = Credit Hours.

* Catalog numbers followed by - (dash) indicate dependent courses and/or prerequisite relationship.
* Catalog numbers followed by , (comma) indicate no dependence.
* Student will work out 6 terms of Physical Education during the first six terms of school.
* Orientation will be scheduled by each new student for the first year in the College of Engineering.
* Course sequences which must be completed in order to advance to the next rank classification.
THIRD YEAR (Rank 63)

Philosophy & Religion I, II, III 115231 - 115232 - 115233

Humanities

*Liberal Arts Major

*Engineering Graphics I, II, Thermo. 201201 - 201202, 201243

*Engineering Mechanics I, II, III 201211 - 201212 - 201213

*Passive & Active Circuits I, II, III 201221 - 201222 - 201223

*Intro. To Engr. Lab, Circuits Lab I, II 201231 - 201232 - 201233

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SURVEYING CAMP FOR CIVILS

*Surveying I 202300 (Post-Spring) (12 Successive Days) 5 hours

FOURTH YEAR (Rank 64)

300 Level Engineering Courses Depending on Department plus Li. A. Major

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FIFTH YEAR (Rank 65)

400 Level Engineering Courses Depending on Department plus Li. A. Major

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### BASIC FOUR YEAR ENGINEERING PROGRAM

#### FIRST YEAR (Rank 24)

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#### SECOND YEAR (Rank 34)

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#### SURVEYING CAMP FOR CIVILS

*Surveying I                                     | 202300 (Post-Spring) | (12 Successive Days) | 5 hours

*R = Recitation,  L = Laboratory,  C = Credit Hours.

Catalog numbers followed by - (dash) indicate dependent courses.
Catalog numbers followed by , (comma) indicate no dependence.
Student will work out six terms of Physical Education during the first six terms of school.
Orientation will be scheduled by each new student for the first year in the College of Engineering.
Course sequences which must be completed in order to advance to the next rank classification.
BASIC COURSES

No sharp line of distinction can be drawn in the fundamental education of civil, electrical, or mechanical engineers for the reason that the sciences basic to engineering—mathematics, physics, chemistry, and the engineering sciences—are essential in all branches of engineering.

Since certain courses in engineering are considered to be fundamental and deal with the basics of the several fields, they are used by all three departments in, at least, the first two years of the curriculum.

Except for advisory purposes, it is not necessary for the student to select a branch of engineering until the last quarter of the rank 34 or 35.

BASIC ENGINEERING

(DEPARTMENT 201)

The basic courses are taught by the engineering faculty and are required of all engineering students except as may be noted.

100. PRE-ENGINEERING REFRESHER. (FOR BEGINNING ENGINEERING STUDENTS) (Pre-Fall). For a period of three weeks, five days per week, eight hours per day, a review of those portions of high school mathematics that are necessary to start college mathematics is offered previous to the opening of the fall quarter. All first year students find the systematic review of value. Topics included are algebra, geometry, trigonometry, and analytical geometry. Students who do not place sufficiently high in mathematics placement tests during summer orientation are required to take this course to prepare to start the calculus. No credit.

001-002-003. ORIENTATION OF ENGINEERING STUDENTS (1+0). For first year students in addition to graduation requirements. Schedules, irregularities in schedules, graduation requirements, class preparations, problem solutions, taking of tests, slide rule, background of various branches of engineering, technical and professional organizations, and professionalism are covered. These are designed to help the student to make the transition from high school to college, as well as, properly orient the student in the profession.

NOTE: (1+0) indicates the student contact hours per week. The first number gives the lecture hours while the second, shows the laboratory hours.

102. **Digital Computation II (1+1)**. Continuation of 101. Prerequisite: Math 242-52 or concurrently, 101. 1 hour.

103. **Digital Computation III (1+1)**. Continuation of 102. Prerequisite: Math 243-53 or concurrently, 102. 2 hours.

201. **Engineering Graphics I (0+4)**. Lettering, use of instruments, applied geometry, orthographic projection, sketching, pictorial sketching, dimensioning. Prerequisite: None. 2 hours.

202. **Engineering Graphics II (0+4)**. Advanced orthographic projection, descriptive geometry; point, line, plane problems, curved surfaces, developments, intersections, perspective. Prerequisite: 201. 2 hours.

211. **Engineering Mechanics I (3+0)**. Fundamental principles of mechanics with vector methods as applied to statics. Includes resultants of force systems, centroids and centers of gravity, equilibrium, friction, moments of inertia, and virtual work. Prerequisite: Math 243-53, Physics 233. 3 hours.

212. **Engineering Mechanics II (3+0)**. Fundamental principles of mechanics with vector methods as applied to dynamics. Includes absolute and relative motion; force, mass and acceleration; work and energy; and impulse and momentum. Prerequisite: 211. 3 hours.

213. **Engineering Mechanics III (3+0)**. Elastic analysis through concepts of stress and strain in tension, torsion, compression, and flexure. Development and application of Mohr's circle construction; analytical methods of determining shear stresses in beams subjected to torsional and flexural loadings, evaluation of shear flow, and shear and moment diagrams. Prerequisite: 212. 3 hours.

221. **Passive & Active Circuits I (3+0)**. Introductory concepts followed by the presentation of a-c circuits as a problem in differential equation theory. Phasor representation, series and parallel circuits, resonance phenomena, and network theorems are studied. Prerequisite: Math 243-53, Physics 233. 3 hours.

222. **Passive & Active Circuits II (3+0)**. Coupled circuits, balanced and unbalanced polyphase circuits, polyphase power measurements, and nonsinusoidal waves. Prerequisite: 221. 3 hours.
223. Passive & Active Circuits III (3+0). Active devices and their equivalent linear active circuits are studied. Prerequisite: 222. 3 hours.

231. Introduction to Engineering Laboratory (1+0). A rational approach to the planning, operation and interpretation of experiments; propagation of errors in instrument systems; dimensional analysis; sequence and spacing of runs; analysis, rejection criteria, and reduction of data. Prerequisite: Math 243-53, Physics 233. 1 hour.

232. Circuits Laboratory I (0+3). A laboratory study of electric circuits including resonant circuits, current and voltage loci and power measurements. Prerequisite: 231 and concurrent with 222. 1 hour.

233. Circuits Laboratory II (0+3). A laboratory study of active devices and their associated circuits. Prerequisite: 232 and concurrent with 223. 1 hour.

243. Thermodynamics I (3+0). Energy and work of conservative systems; temperature and other properties by methods of statistical inference; laws of thermostatics and thermodynamics for macroscopic systems by reasoning from premises of microscopic behavior. Prerequisite: Physics 233, Math 243-53, Chemistry 133. 3 hours.

321. Thermodynamics II (3+0). Properties of thermodynamic systems; relations among properties; application of thermodynamic laws to closed and open systems. Prerequisite: 243. 3 hours.

322. Fluid Mechanics (3+0). Mechanics of compressible and incompressible liquids, fluid statics and steady flow in pipes. Prerequisite: 212. 3 hours.

CIVIL ENGINEERING DEPARTMENT

Professor Archer (Chairman); Associate Professor Hillery; Assistant Professors Milks, Wu, Chopra; Mr. Yen P. Wu.

The Civil Engineer conceives, designs, and supervises the building of projects, coordinating and utilizing all resources for all types of developments. He works in many broad fields of specialization such as structural engineering, construction engineering, highway and transportation engineering, sanitary engineering, soil engineering, surveying, mapping, city managing, and consultant in engineering.

Department facilities include high grade instruments and appliances, well-equipped laboratories, a large modern design room, and a scientific library. Laboratory work is offered in testing materials, concrete, soil mechanics and fluid mechanics, as well as field work in surveying.
### CIVIL ENGINEERING

(See page 128 For First & Second Year and Notation)

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*Course sequences which must be completed in order to advance to the next rank classification.*
Engineering education instills within the student the ability to know how, to know why, and to do the best engineering job possible for his client for the least amount of money in keeping with the Code of Ethics of the Professional Engineer.

**CIVIL ENGINEERING**

(Department 202)

300. *Surveying I* (3+6) (Surveying Camp). Use of various tapes, level, and transit; differential and profile leveling; traversing; earthwork calculations; presence and magnitude of errors; the application of surveying methods of land, city, and topographic surveys. Prerequisite: 201202, Math 152. 5 hours.

301. *Mechanics of Materials* (3+0). Combined loadings, columns, repeated loading, dynamic loading, connections, methods of determining deflections of flexural loading, and solution of statically indeterminate beams. Prerequisite: 201213. 3 hours.

311. *Numerical Analysis* (3+0). Matrix methods, linear programming, various numerical methods, and application of these to civil engineering problems using a computer. Prerequisite: Math 353. 3 hours.

312. *Structural Analysis I* (3+3). Superposition, elastic-energy expressions, deflection analysis, real work, differential equations of elastic curve method, auxiliary load method, and application of these methods to the method of consistent distortion to solve statically indeterminate structures. Prerequisite: 301, 311. 4 hours.

313. *Structural Analysis II* (3+3). Application of action and displacement methods using the method of consistent distortion to evaluate indeterminate structures. Prerequisite: 312. 4 hours.

323. *Hydraulics* (3+0). Flow in pipes and complex pipe systems; introduction to non-uniform flow in open channels and rivers; elementary hydraulic model theory; pumping machinery. Prerequisite: 201322. 3 hours.

331. *Surveying II* (3+4). Theory and practice in horizontal and vertical curves as applied to the location and design of highways, railroads, and other routes of transportation, with special emphasis on highway geometrics. Procedures and problems encountered in high-order control surveys for bridges, dams, tunnels, and other large construction projects. Prerequisite: 300. 5 hours.
332. PHOTOGRAMMETRY (2+3). The use of aerial photography in different phases of engineering such as transportation, surveying, etc; air photo interpretation; study of devices used in photogrammetry; analytic solution of tilt and rectification problems; and controlled mosaics. Prerequisite: 331. 3 hours.

333. TRANSPORTATION ENGINEERING (4+0). A study of transportation systems covering the areas of geometric design, location, development, prediction for future demands, finance, and economics. Prerequisite: 332. 4 hours.

341. ENGINEERING MECHANICS LABORATORY I (0+3). Experimental verification of fundamental theories of mechanics of materials; advanced instrumentation. Introduction of techniques of model analysis. Prerequisite: 201-213 and 301 concurrently. 1 hour.

342. ENGINEERING MECHANICS LABORATORY II (0+3). Verification of fundamental principles covered in Fluid Mechanics and Hydraulics. Calibration of hydraulic measuring devices; measurement of pipe friction; flow in open channels; and efficiency tests of centrifugal pumps. Prerequisite: 341 and 201322 concurrently. 1 hour.

352. MATERIALS SCIENCE (2+3). Theory and practice in the design of concrete mixes. A study of the physical and chemical properties of cements and aggregates, brick, block, tile, and stone. Use of admixtures in concrete and natural destructive agents. Laboratory study of the methods of design of bituminous concrete mixes as applied to airport runways and highways and the study of the physical and chemical properties of constituent materials. Prerequisite: 301, Chemistry 133. 3 hours.

353. ENGINEERING GEOLOGY (3+0). Study of minerals and rocks; physical, historical and structural geology; geological forms; land formations; planning of soil surveys. Techniques of air photo interpretation in identifying the engineering properties of soil: surface and subsurface geological maps. Field trip. Prerequisites: 300, Chemistry 133, or by special permission. 3 hours.

411. SANITARY ENGINEERING I (3+0). Principles and methods of water purification, sewage treatment, and disposal; control tests and correlation of results with treatment plant operations; interpretation of reports; inspection of local plants. Prerequisite: Chemistry 133, 323. 3 hours.

412. SANITARY ENGINEERING II (3+0). Development of sources of water supply; determination of quantity of storm water; design of water distribution systems; design of storm water sewers; design of sanitary sewers; hydraulic design of water and sewage treatment plants. Prerequisite: 411. 3 hours.
413. **Construction Methods (2+3).** Specifications, economical construction methods, quantity take-offs, cost analysis, and cost estimating as applied to various engineering projects. Prerequisite: 421, 441. 3 hours.

421. **Reinforced Concrete I (3+3).** Elastic design and ultimate strength of structural elements; beams in bending, bond, shear; diagonal tension in beams, axially loaded columns, and eccentrically loaded columns; and application of codes and specifications to design. Prerequisites: 313, 352. 4 hours.

422. **Reinforced Concrete II (3+3).** Retaining walls, footings, two-way and flat slabs, and thin shell roofs. Design of concrete buildings and bridges. Prerequisite: 421. 4 hours.

423. **Prestressed Concrete (2+3).** The principles of prestressing, general equation for flexural design, pretension and post-tension, losses in prestress, shear, and diagonal tension, and deflections. Design of prestressed concrete members. Prerequisite: 422. 3 hours.

431. **Soil Mechanics (3+3).** An introduction to soils engineering, physical properties of soils as affecting engineering design and construction, soil sampling, mechanics of soil masses, consolidation, settlement, and laboratory soil tests. Prerequisites: 323, 353. 4 hours.

432. **Foundation Engineering (3+3).** Analysis of stress conditions imposed on the supporting soils by foundations. Design of foundations, retaining structures, and piles. Prerequisite: 431. 4 hours.

433. **Engineering Law (3+0).** Legal principles of vital interest to engineers. General nature of law and the working of the judicial system. Contracts, agencies, sales, negotiable instruments, workman's compensation, mechanics lien, property, patents, and expert testimony. Prerequisite: Rank of 54 or 55. 3 hours.

441. **Structural Design I (2+6).** The design of beams, columns, beam columns, built-up members, and connections. Use of influence lines and various other techniques for determining maximum loadings. Prerequisite: 313. 4 hours.

442. **Structural Design II (2+3).** Theory of plastic design; analysis of ultimate load, design of connections, determination of deflections using plastic design, and comparison to elastic design. Prerequisite: 441. 3 hours.

443. **Advanced Structural Mechanics (3+0).** Theory of elasticity, structural stability, plates and shells, and vibrations. Prerequisite: 442. 3 hours.
490. CIVIL ENGINEERING PROJECT; OR, SPECIAL PROBLEMS; OR, ADVANCED TRANSPORTATION ENGINEERING; OR, ADVANCED SANITARY ENGINEERING; OR, ASTRONOMY AND GEODESY; OR, HYDROLOGY AND HYDRAULIC ENGINEERING (2–3). Practical projects involving calculation, design, drafting, and engineering judgment. Prerequisite: rank 54 or 55; OR, special problems, Prerequisite: Last Quarter of rank 54 or 55; OR, topics in highway, railroad, water, and air transportation, Prerequisite: 333, 432; OR, the application of engineering principles toward the control of the environment for the protection and improvement of the health and comfort of man, including the design of water and sewage treatment plants and the reduction of air pollution, Prerequisite: 411, 412; OR, fundamentals of spherical trigonometry, celestial coordinate systems, variations of star coordinates, different positions of stars, time systems, determination of astronomical positions adjustment of a traverse, properties of ellipsoid, geodetic sections, spherical excess, direct and inverse problems. Clark's formula for long lines, datums, and electronic distance measuring instruments, Prerequisite: 332; OR, elementary treatment of major topics in hydrology, including rainfall, evaporation groundwater and runoff. Treatment of advanced problems in river mechanics including flood routing, channel improvement, and spillway and reservoir design, Prerequisite: 323. 3 hours.

ELECTRICAL ENGINEERING DEPARTMENT

Professor Klingengerger (Chairman); Associate Professor Carmean; Assistant Professors Aktas, Bender, Tseng; Mr. Busch

Electrical engineering is basically the science and application of electricity and magnetism. It treats the laws governing energy conversion, communication science, vacuum tube and solid state electronics, power systems, automatic controls, and electronic analog and digital computers.

The electrical engineering curriculum coordinates theoretical background with scientific working knowledge. The student starts the electrical engineering sequence by studying basic circuit theory. In these and subsequent courses he will work in electronics, electromagnetic fields and waves, network analysis and synthesis, energy conversion, automatic control systems, and communication theory.

Classroom activities are supplemented by work in well equipped laboratories. Problem solving is emphasized and particular attention is placed upon the use of the analog and digital computers which are readily available in the Engineering building.
# ELECTRICAL ENGINEERING

(See Page 128 For First & Second Year and Notation)

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*Course sequences which must be completed in order to advance to the next rank classification.
This curriculum is designed to provide an excellent background for students who intend to pursue specialized work in graduate school, or who may choose employment in any of the following fields: radio communication, television, wire communications, electronics, development of electrical equipment and controls for the aerospace sciences, construction and operation of generating stations and electric power systems, installation and operation of equipment in industrial plants, design of power apparatus, and manufacture and sale of electrical equipment.

**ELECTRICAL ENGINEERING**

(Department 203)

301. **Engineering Analysis (3+3).** Emphasis on use and practicability of numerical methods in solution of actual engineering problems. Prerequisite: Math 353. 4 hours.

311. **Electronics I (3+0).** Small-signal amplifiers; feedback; audio-frequency and radio-frequency amplifiers with large signals. Prerequisite: 201223. 3 hours.

312. **Electronics II (3+0).** Oscillators; AM-FM-PM modulation and demodulations. Prerequisite: 311. 3 hours.

323. **Network Analysis (3+0).** Matrix circuit and topological circuit analysis; signal-flow graphs and circuit analysis; one-port reactive networks; two-port reactive networks. Prerequisite: 342. 3 hours.

331. **Fields and Waves I (4+0).** Electrical phenomena from the viewpoint of field theory. Vector analysis used throughout. Prerequisite: 201223, Math 353. 4 hours.

332. **Fields and Waves II (4+0).** Continuation of 331. Prerequisite: 331. 4 hours.

333. **Fields and Waves III (4+0).** Electric energy propagation; infinite line; lossless lines; Smith Chart; impedance transformation and matching; loss line analysis; wave guides; group and phase velocity; impedance of wave guides. Prerequisite: 322. 4 hours.

342. **Transient Analysis (4+0).** Application of Laplace Transform methods to transient phenomena in linear electrical and mechanical systems. Prerequisite: 201223, Math 353. 4 hours.
343. Control Systems I (3+0). A course in closed-loop systems performance from equations and transfer-function plots. Prerequisite: 342. 3 hours.

351. Electrical Engineering Laboratory I (0+3). Tube and transistor multistage amplifiers, radio-frequency amplifier; audio frequency power amplifier; feedback amplifier. Prerequisite: 311, or concurrently. 1 hour.

352. Electrical Engineering Laboratory II (0+3). Design and evaluation of single frequency oscillator; amplitude modulation; demodulation of a modulated wave. Prerequisite: 351, and 312 or concurrently. 1 hour.

353. Electrical Engineering Laboratory III (0+3). Introduction to analog computer programming. Prerequisite: 342. 1 hour.

411. Electronics III (3+0). Wave generation and shaping. The study of timing, switching, logic, and memory circuits. Prerequisite: 311, 342. 3 hours.

412. Electronics IV (3+0). Electronics power conversion circuits and devices. Power control and regulator circuits; power supply filters. Prerequisite: 411. 3 hours.

421. Circuit Synthesis (3+0). Introduction to the principles of modern circuit synthesis. Prerequisite: 323, 342. 3 hours.

422. Nonlinear Analysis (3+0). Analysis of physical systems containing non-linear elements. Analytical, graphical, and numerical methods are studied. Prerequisite: 441. 3 hours.

423. Communication Theory (3+0). An introduction to the principles of communication theory. Prerequisite: 312, 342. 3 hours.

431. Energy Conversion I (3+0). The underlying principles of electro-mechanical energy conversion are studied. Direct-current machines, transformers and steady-state operation of synchronous and induction machines. Prerequisite: 342. 3 hours.

432. Energy Conversion II (3+0). Transient analysis of synchronous machines. Unbalanced operation of induction machines. Prerequisite: 431. 3 hours.

433. Energy Conversion III (3+0). An introduction to non-electro-mechanical energy converters, thermoelectricity; thermionic converters; MHD engines; photovoltaic effect, and solar cells. Prerequisite: 351, Physics 303. 3 hours.

441. Control Systems II (3+0). Control system design using root locus and frequency response methods. Prerequisite: 343. 3 hours.
451. **Electrical Engineering Laboratory IV (0+3).** Transmission line; attenuation, magnitude and phase of voltage and current on lines; reflected waves. Prerequisite: 333, 411 concurrently. 1 hour.

452. **Electrical Engineering Laboratory VI (0+3).** Electronic wave shaping and switching circuits. Filters and power electronics application. Prerequisite: 412 concurrently. 1 hour.

453. **Electrical Engineering Laboratory VIII (0+3).** Laboratory study of nonlinear systems utilizing analog and digital computer techniques. Prerequisite: 422, 452, 423 concurrently. 1 hour.

461. **Electrical Engineering Laboratory V (0+3).** Laboratory study of automatic control systems. Electromechanical energy conversion equipment. Prerequisite: 353, 431, and 441 concurrently. 1 hour.

462. **Electrical Engineering Laboratory VII (0+3).** Study of the generalized machine and other DC, synchronous, and induction machines. Prerequisite: 461, 432 concurrently. 1 hour.

463. **Electrical Engineering Laboratory IX (0+3).** Continuation of 462. Prerequisite: 462, 433 concurrently. 1 hour.

490. **Special Projects; or Directed Individual Study; or Selected Topics; or Design Seminar; or Seminar.** The independent planning and conduct of an engineering design or development project; or, individual study of a topic of particular interest to the student; or, group study of selected topics of current interest; or, a series of discussions with practicing engineer pertaining to design problems under their direction. Prerequisite: Departmental permission required. 1-3 hours.

**MECHANICAL ENGINEERING DEPARTMENT**

PROFESSOR HORLDT; ASSOCIATE PROFESSOR BURTON (CHAIRMAN); ASSISTANT PROFESSORS FARRINGTON, WHISLER

Mechanical Engineering is a general term which may include the specialized fields of applied mechanics, automotive engineering, heat transfer, machine design, materials handling, power, production engineering, and many others.

The mechanical engineer today is faced with such vital problems as space flight, automation, ever greater demands on the use of existing materials and mechanisms in missiles, automotive, electronic, and other fields, and the design of equipment necessary to produce them.
Every mechanical engineering student has the opportunity to use extensively the engineering analysis and design laboratories as well as the Computer Center. The laboratories are equipped to supplement all engineering courses. They provide instructions, procedures, and techniques for the individual as well as group projects and limited undergraduate research.

MECHANICAL ENGINEERING

(DEPARTMENT 204)


312. MATERIALS II (2+0). Manufacturing processes: an introductory course to cover the basic machining operations (turning, drilling, boring, milling, planing, shaping, grinding, forging, shearing, and pressing), their machines, tools, and equipment; gaging and inspection; their programming for numerical and tape control of automation type mass-production equipment. Prerequisite: 311. 2 hours.

313. INTRODUCTION TO DESIGN (0+4). An introductory course covering the specialized aspects to, and preparatory for, mechanical design. The main object is the use and application of metallurgical and manufacturing processes. All drawings are executed according to existing commercial and industrial standards. Prerequisite: 312. 2 hours.

323. GAS DYNAMICS (3+0). Isentropic (including nozzles and diffusers), diabatic, and frictional flow cases. Shock phenomena and generalized onedimensional flow. Prerequisite: 201322. 3 hours.

331. MECHANICAL ENGINEERING LABORATORY I (0+6). 2 hours.

332. MECHANICAL ENGINEERING LABORATORY II (0+6). 2 hours.

333. MECHANICAL ENGINEERING LABORATORY III (0+6). 2 hours.
Fundamental mechanical laboratory sequence: specific experiments involving measurements, instrumentation, calibration, and analysis of experimental accuracies. Concurrent small-team investigative projects of timely interest. Prerequisite: Rank 44 or 45.
## MECHANICAL ENGINEERING

(See Page 128 For First & Second Year and Notation)

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*Course sequences which must be completed in order to advance to the next rank classification.
341. Kinematics (3+3). The study of mechanisms and their motion: acceleration, velocity, and displacement of machine elements (gears, cams, etc.). Prerequisite: 201212. 4 hours.

342. Advanced Thermodynamics (3+0). Chemical reactions; generalized equilibrium and special non-equilibrium topics. Prerequisite: 201321. 3 hours.

343. Heat Transfer I (3+0). Heat mass and momentum transfer in stationary systems (including steady one, two, and three dimensional conduction as well as unsteady one dimensional conduction), laminar flow systems, and radiant heat transfer. Prerequisite: Math 353, 201322. 3 hours.

402. Production Engineering (3+0). An introduction to scientific organizing, standardizing, and operating principles in production engineering. Basic industrial management and principles of engineering administration. Capabilities of manufacturing processes, analysis of machining, and metal removing requirements—tools, dies, jigs and fixtures, and special machinery. Fundamentals of time and motion study, quantity and quality control, space, location and material flow for a manufacturing enterprise. Prerequisite: 313. 3 hours.

403. Advanced Engineering Analysis (3+0). Practical analyses of realistic problems: approximations and numerical analysis. Prerequisite: Rank 54 or 55. 3 hours.

411. Mechanical Design I (3+3). 4 hours.

412. Mechanical Design II (3+3). 4 hours.
Sequence of design of machine elements: analytical study of shafts, bearings, gears, fasteners, clutches, couplings, etc., and preparation and execution of drawings according to professional standards. Prerequisites: 202301, 313, 341.

413. Mechanical Design III (3+3). Machine design: complete design and layout of a machine or unit as used in a particular branch of mechanical engineering including in the design the previously studied elements and mechanisms, in order to develop engineering judgment and professional proficiency from the original conception of an idea to the finished product. Prerequisite: 412. 4 hours.

421. Thermal System Analysis I (2+0). 2 hours.

422. Thermal System Analysis II (2+0). 2 hours.
423. **Thermal System Analysis III** (2+0). 2 hours.
Integration of the fundamental (and repetitive) thermal aspects of the traditional fields of internal combustion engines, steam power stations, environmental control and turbomachines with emphasis on the system analysis approach and simulation techniques. Prerequisite: 203323, 342, 343.

431. **Mechanical Engineering Laboratory IV** (0+6). 2 hours.

432. **Mechanical Engineering Laboratory V** (0+6). 2 hours.

433. **Mechanical Engineering Laboratory VI** (0+6). 2 hours.
Applied mechanical laboratory sequence: specific performance tests of engines, fluid handling devices, environmental condition-apparatus, etc. Concurrent investigative projects of individual interest and nature. Stresses development of the art of communication in reporting laboratory work. Prerequisite: 333.

441. **Heat Transfer II** (3+0). Heat, mass, and momentum transfer in turbulent flow systems. Heat transfer with boiling and condensation, in high velocity flow and rarefied gases. Prerequisite: 343. 3 hours.

442. **Advanced Engineering Mechanics I** (3+0). Methods of structural mechanics with applications to curved flexural members, thick-walled cylinders, contact stresses, stress concentration, and other selected topics in stress analysis. Prerequisite: 202301. 3 hours.

443. **Advanced Engineering Mechanics II** (3+0). Special topics in the area of mechanical vibrations and advanced dynamics. Prerequisites: 201, 212, 203342. 3 hours.

490. **Mechanical Engineering Projects.** Practical studies of investigations involving the application of original thought, the determination of new information and/or new application of known information or equipment. Prerequisite: Rank 54 or 55. 1-5 hours.
College Of Pharmacy

Dr. LeRoy D. Beltz, Dean

Ohio Northern University has been engaged in the education of pharmacists since 1884. The College of Pharmacy is an integral part of the University. It is recognized and approved by the Board of Pharmacy of the State of Ohio. It is a member of the American Association of Colleges of Pharmacy.

FACULTY OF THE COLLEGE OF PHARMACY

OFFICERS:

LeRoy D. Beltz, Dean

Henry D. Roth, Secretary

FACULTY:

*LeRoy D. Beltz, Ph.D., Dean

*Robert P. Fischelis, Pharm. D., Sc.D., Dean Emeritus; Director of Continuing Studies

*Walter Frazier, Ph.C.**, Professorial Lecturer in Hospital Pharmacy

*John E. Hall, B.S., Instructor in Pharmacology and Toxicology

*Charles O. Lee, Ph.D., Professor of Pharmacy; Acting Chairman, Department of Pharmacy

Morton Mallin, Ph.D., Associate Professor of Microbiology; Acting Chairman, Department of Biological Sciences

*Robert L. Powell, B.S.**, Instructor in Pharmacology and Toxicology

*Henry D. Roth, Ph.D., Professor of Pharmacy; Secretary of the College of Pharmacy

*Walter B. Severs, Ph.D.**, Assistant Professor of Pharmacology and Toxicology

* Registered Pharmacist
** Part-time
AIMS AND OBJECTIVES

In addition to the general objectives set forth by the University, the College of Pharmacy includes the following among its aims and purposes:

Preparing students to meet satisfactorily the professional and cultural standards expected of pharmacists and to carry their share of the responsibility for improvement of the quality of the health, welfare and educational services to their respective communities.

Counseling students in the development of self-reliance, character and ethical concepts to the end that they will render safe and efficient pharmaceutical service to all who seek it.

Acquainting students with the need for and value of membership in local, state and national pharmaceutical associations and in civic, social and religious bodies of the communities in which they live. In this connection, student affiliation with chapters of the American and Ohio State Pharmaceutical Associations is strongly urged.

To accomplish these scholastic, professional, and social goals, faculty counselors are available to advise students concerning their plans of study and every encouragement is offered to maintain high standards of scholarship. Participation in a reasonable number of campus activities is encouraged in the belief that such activities, properly adjusted to the student's opportunity and ability to carry them, will broaden his outlook, enrich his college experience, and add much to his preparation for life.

REQUIREMENTS FOR ADMISSION TO PRE-PROFESSIONAL EDUCATION

Students entering the pre-professional pharmacy program should have at least three years and preferably four years of English; two years of mathematics (algebra and plane geometry), but priority will be given to students with addi-

* Registered Pharmacist
** Part-time
tional credit; two to three years of science (biology, general science, and chemistry or physics or both). Priority will be given to students with four years of science subjects.

Entering students in the pre-professional pharmacy program must meet Liberal Arts entrance requirements.

Further information may be obtained from the College of Pharmacy.

**REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF PHARMACY**

1. To enter the College of Pharmacy an applicant must furnish to the committee on admissions of the College of Pharmacy proof of satisfactory completion of not less than 98 quarter hours, or 65 semester hours, with an accumulative grade point average of 2.0 (“C” average). Further, the applicant must complete the requirements (or their equivalent) listed in the Pharmacy Pre-Professional Program, which includes the English Proficiency Test.

For recommended pre-professional courses, see "Description of Courses" section.

2. **Advanced Standing.** A student desiring to transfer from another college must present a transcript of his record and a certificate of honorable dismissal from the college he is leaving. He also should submit a catalog of his college. Full credit will be given for work satisfactorily completed in recognized institutions of higher learning, provided such work is parallel to the requirements for graduation in this institution, but credit will not be allowed for a course in which the lowest passing grade was received (i.e.—grades below C).

Persons who meet the requirements for admission as indicated in the preceding paragraphs are issued a Permit to Enter the College of Pharmacy. To enter any of the regular courses of study the candidate, after being granted a Permit to Enter, must prepare a schedule of studies with the aid of an adviser and approval of the Dean, and pay tuition and fees as stated elsewhere in this catalog.

Students who are entitled to advanced standing may enter at the time approved by the Dean. All pharmacy courses in the Pre-professional Program must be completed before the student is permitted to enter the second year of the Professional Program.
3. **Scholarship Rating and Probation.** Good academic standing requires a 2.0 (C) average. A student falling below this is placed on warning at the first occurrence. If he falls below a 2.0 average the following or any subsequent quarter he will be placed on probation. A student on probation who fails to meet the terms of his probation is subject to suspension or dismissal.

A student on probation is subject to any restrictions in extracurricular activities placed upon him by the scholarship committee of the College of Pharmacy.

No student will be allowed to proceed from one professional year to the next unless the professional accumulative point average and the overall accumulative point averages (including both professional and non-professional courses) are 2.0 or better in required and approved elective subjects.

**Requirements for Graduation**

Each candidate for a degree:

1. Must successfully pass an English Proficiency test.
2. Must be of good moral character.
3. Must have completed not less than 240* quarter hours of acceptable course work and 6 quarter hours of physical education
4. Must have maintained an overall 2.0 grade point average and have an accumulative grade point average of 2.0 in all courses in the Departments of Pharmacy, Pharmaceutical Chemistry and Biological Sciences.
5. Must meet such other qualifications as the faculty may determine.

**Qualifications for Examination and Registration as a Pharmacist**

Every Applicant shall:

1. Be a citizen of the United States, or shall have made application therefor;
2. Be not less than twenty-one years of age;
3. Be of good moral character and habits;
4. Be a graduate from a school or college of pharmacy or a department of pharmacy of a university recognized and approved by the State Board of Pharmacy.
5. File proof to the Board, substantiated by proper affidavits, of a minimum of one year's internship under the personal supervision of a registered

*250 quarter hours will be required for the graduating class of 1969.*
pharmacist, operating under the Preceptor program of the Board. Credit for internship may be granted only if obtained when the intern is not enrolled and in attendance in a college or university. Internship credit will not be given for experience gained prior to the completion of one academic year in a college or university.

LIBRARY

The facilities of the main library of the University are at the disposal of pharmacy students. Many of the current books and classics contributing to an appreciation of the liberal arts and the sciences are to be found there along with books, periodicals and journals dealing with pharmacy and related professions. Most books and bound periodicals pertaining to pharmacy, medicine and related sciences are presently housed in the main library. Current issues of pharmaceutical and related professional journals are available in the reading room of the College of Pharmacy. Reference library facilities are available in the Pharmacy Continuation Studies Center.

Pharmacy students are encouraged to make greater use of available library facilities and will be assigned topics for term papers requiring library research.

ORGANIZATION OF COURSES

The present minimum educational requirement for admission to the practice of pharmacy in the various states consists of five years of study at the college level. At Ohio Northern University this five year program is presently divided into two major sections, the pharmacy-liberal arts section (PLA1 and PLA2) which is covered in the first two years at the College of Liberal Arts and the professional section (P3, P4 and P5) which is covered in the final three years in the College of Pharmacy.

The professional curriculum in the College of Pharmacy is administered under three major divisions; namely, the Department of Pharmacy, the Department of Pharmaceutical Chemistry and the Department of Biological Sciences. These departments include all necessary courses in the five classifications used for purposes of accreditation by the American Council on Pharmaceutical Education; namely, Pharmacy, Pharmaceutical Chemistry, Pharmacology, Pharmacognosy and Pharmacy Administration.

The Department of Pharmacy includes courses in pharmacy orientation, pharmacy calculations, health orientation, introduction to pharmacy, pharmaceutical preparations, history of pharmacy, vocational pharmacy, ethics and social obligations, prescription practice, and pharmacy administration. There are also a number of elective courses in this department which are described in subsequent pages.
The Department of Pharmaceutical Chemistry includes courses in chemistry of inorganic medicinal products, biochemistry, chemistry of natural and synthetic organic medicinal products, pharmaceutical analysis and instrumentation. There are also a number of elective courses in this department which are described in subsequent pages.

The Department of Biological Sciences includes courses in introductory microbiology, medical microbiology, pharmacognosy, biological sources of drugs, pharmacodynamics, physiology, introduction to pharmacology, toxicology, and principles and practice of public health. There are also a number of elective courses in this department which are reviewed on subsequent pages.

THE FIVE YEAR PHARMACY PROGRAM

The following general plan of study has been projected for the degree of Bachelor of Science in Pharmacy under the five year program of study. This program is constantly under revision and the current course content will appear in the separate catalog of the College of Pharmacy as published periodically.

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* Students are registered in the College of Liberal Arts as Pharmacy-Liberal Arts students (PLA) during the first two years of the Pre-Professional program.

** Students who contemplate entering the Retail field of Pharmacy should take the Economics sequence, Economics 201, 202, 203.

*** Students contemplating Graduate Study should take Physics 241, 242, 243 and Math. 153.
### Professional Program

#### THIRD YEAR (P-3)

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**Total Hours** 17

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**Total Hours** 17

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<td>Pharmacy 551</td>
<td>Pharmacy 552</td>
<td>Pharmacy 560</td>
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<td>3</td>
<td>4</td>
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<tr>
<td>Pharm. Chem. 531</td>
<td>Electives</td>
<td>Electives</td>
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<td>4</td>
<td>5</td>
<td>6</td>
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</tbody>
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**Total Hours** 18

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<tr>
<th>Biological Science 461</th>
<th>Liberal Arts</th>
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<tr>
<td>4</td>
<td>Biology 301-303</td>
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<td></td>
<td>Chemistry 341-343, 352-353, 363</td>
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<td></td>
<td>Economics 322, 323, 333, 351, 363, 371-373</td>
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<td>English 201-203, 211-213, 301-303</td>
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<td>History 111-113, 211-213, and others</td>
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<td></td>
<td>Music 200 and 351-353</td>
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<td></td>
<td>Philosophy and Religion 351-353, and 331-333</td>
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<td>Political Science 201-203</td>
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<td>Psychology 111, 311, 332</td>
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<td>Sociology 201-203, 331, 341-342-343</td>
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<td></td>
<td>Education (for those wishing to obtain a teacher's certificate)</td>
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</tbody>
</table>

*Substitution permitted for students preparing for Graduate School

**NOTE:** All students who contemplate going into Retail Pharmacy should take Pharmacy 551, 552, and 553 in the 4th year, if possible, so business electives can be taken in the 5th year.

### APPROVED ELECTIVES (those counting toward graduation)

<table>
<thead>
<tr>
<th>College of Pharmacy</th>
<th>Liberal Arts</th>
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<td>Pharmacy 500</td>
<td>Biology 301-303</td>
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<td>Pharmacy 510</td>
<td>Chemistry 341-343, 352-353, 363</td>
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<td>Pharmacy 520</td>
<td>Economics 322, 323, 333, 351, 363, 371-373</td>
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<td>Pharmacy 550</td>
<td>Foreign Languages</td>
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<tr>
<td>Pharmacy 570</td>
<td>History 111-113, 211-213, and others</td>
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<tr>
<td>Pharm. Chem. 530</td>
<td>Music 200 and 351-353</td>
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<td>Pharm. Chem. 540</td>
<td>Philosophy and Religion 351-353, and 331-333</td>
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<tr>
<td>Pharm. Chem. 550</td>
<td>Political Science 201-203</td>
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<tr>
<td>Biological Science 461</td>
<td>Psychology 111, 311, 332</td>
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<tr>
<td>Biological Science 462</td>
<td>Sociology 201-203, 331, 341-342-343</td>
</tr>
<tr>
<td>Biological Science 550</td>
<td>Education (for those wishing to obtain a teacher's certificate)</td>
</tr>
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</table>
DESCRIPTION OF COURSES

PRE-PROFESSIONAL PROGRAM

For description of the basic pre-professional courses turn to the pages listing these departments elsewhere in this catalog.

COURSE REQUIREMENTS

PROFESSIONAL PROGRAM

DEPARTMENT OF PHARMACY

(Department 301)

(NOTE: First Number in parentheses is lecture hours per week, second is laboratory hours per week.)

102 and 103. Pharmacy Orientation (1+0). These courses follow the one in the Liberal Arts College and are designed to introduce the student to the educational and legal requirements of pharmacy, its organizations, and the areas of service available to those who are properly qualified. 1 hour each.

200. Pharmacy Calculations (3+0). Weights, measures, density, percentage, discounts, and related subjects as they pertain to pharmacy. 3 hours.

201, 202. Health Orientation (1+0). To orient the pharmacy student in the greater field of health and medical care to which the profession of pharmacy contributes an indispensable function. 1 hour.

301. Introduction to Pharmacy (3+3). The chemical and physical theories which are considered basic to the science of pharmacy. The laboratory work will, in so far as possible, apply to the theoretical problems. Prerequisites: Third year standing and Chemistry 133 and 233. 4 hours. Formerly Pharmacy 210.

302. Pharmaceutical Preparations (3+3). The manufacture of official solutions, suspensions, and other liquid preparations; the chemistry and/or the physics involved in making these products, and the correct procedures to be used in manufacturing, packaging and labeling. Prerequisites: Pharmacy 200 and 301. 4 hours. Formerly Pharmacy 301.
303. PHARMACEUTICAL PREPARATIONS (3+3). A continuation of course 302; the manufacture of solid and semi-solid preparations, such as ointments, pastes, tablets, capsules and related products. Prerequisite: Pharmacy 302. 4 hours. Formerly Pharmacy 302.

410. HISTORY OF PHARMACY (3+0). The educational, organizational and professional growth and development of pharmacy in the United States and pharmacy's place in Western Civilization. Prerequisites: Fourth year standing and Pharmacy 303. 3 hours.

411. HOSPITAL PHARMACY (1+0). The administrative and professional principles and concepts of the practice of pharmacy in hospitals. 1 hour.

500. ETHICS AND SOCIAL OBLIGATION (3+0). Ethics in professional and business practices and interprofessional relations; the pharmacist's place in the social structure of our times and his relation to the modern concepts of medical care for all economic groups. Library reading assignments and reports required. Prerequisites: Pharmacy 303 and Fifth year standing. (el) 3 hours.

501-502-503. PRESCRIPTION PRACTICE (3+3). The prescription: the receiving, filling, handling involved in all compounding techniques and procedures. Includes a discussion of chemical, physical, and therapeutic incompatibilities. Prerequisites: Fifth year standing and Pharmacy 303, Ph. Ch. 462, Biological Science 403. 4 hours each.

510. PHARMACY COSMETICS. Formulation, preparation, and packaging of well known classes of cosmetics. Library reading assignments and reports required. Prerequisites: Pharmacy 303. (el) 3 hours.

520. INORGANIC PHARMACEUTICALS (2+3). Manufacture of the more difficult medicinal products; library reading assignments and reports. Prerequisites: Pharmacy 303. (el) 3 hours.

530. MANUFACTURING PHARMACY (1+6). The formulation and fabrication by mechanized methods of a variety of pharmaceutical dosage forms. Prerequisites: Open to 5th year students, Ph. 303, Ph. Ch. 462. (el) 3 hours.

550. PHARMACY PROBLEMS. For students interested in undergraduate research. (el) 1-3 hours.

551. PHARMACY ADMINISTRATION (LAW) (3+0). Federal, state and local acts and regulations governing the practice of Pharmacy and the sale of potent and habit forming drugs. Government bulletins and pamphlets are supplied. 3 hours.
552. Pharmacy Administration (Marketing) (4+0). The marketing of drugs and drug products from the manufacturer's and wholesaler's standpoint; laws governing commercial manufacture, distribution, and the various fair practices acts, as they pertain to pharmacy. 3 hours.

553. Pharmacy Administration (Management) (4+0). Drug store business methods; arrangement of fixtures and stock, sources of supplies, distribution to the physician, dentist, veterinarian, the public hospitals; other phases of business essential to successful drug store management.
Prerequisite: Economics 131. 3 hours.

560. Contemporary Pharmacy (2+0). Current problems of pharmacy; factual analyses, panel discussions. The current literature of pharmacy will be reviewed from the standpoint of accuracy, adequacy and reliability for professional guidance. 2 hours.

570. Advanced Hospital Pharmacy. The functions, systems and responsibilities of hospital practices; policies, procedures and the application of principles to the practice of pharmacy in hospitals. (el) 1-3 hours.

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY
(Department 302)

331. Chemistry of Inorganic Medicinal Products (5+0). Methods of preparation, chemical properties, solubilities, tests for identification and purity, and medicinal properties. Prerequisites: Third year standing and Chemistry 133. 5 hours. Formerly 533.

332. Pharmaceutical Analysis (3+3). Procedures and theories of gravimetric and volumetric analysis, their application and use in pharmaceutical analysis. Prerequisites: Chemistry 133 and Pharm. Chem. 331. 4 hours. Formerly 331.

Prerequisites: Chemistry 233 and Pharmaceutical Chemistry 332. 4 hours. Formerly 332.
431. Biochemistry (3+3). This course covers the chemistry of carbohydrates, fats, proteins, nucleic acids and enzymes and the metabolism of carbohydrates. Prerequisite: Chemistry 233. 4 hours.

432. Biochemistry (3+3). A continuation of Pharm. Chem. 431. This course deals with the metabolism of fats, proteins and nucleic acids, the chemistry of blood, respiration, diuresis and diuretics, vitamins and hormones. Prerequisite: Pharmaceutical Chemistry 431. 4 hours.

461. Chemistry of Organic Medicinal Products (4+0). The structural relationships and chemical properties of medicinal products of natural and synthetic origin. Prerequisites: Chemistry 233, Pharmaceutical Chemistry 333. 4 hours. Formerly 531.


530. Chromatographic Analysis (1+3). Types of chromatographic analysis and electrophoresis. Prerequisites: Physics 213, Pharmaceutical Chemistry 432, 462. (el) 2 hours.

531. Pharmaceutical Analysis and Instrumentation (2+6). A continuation of plant chemistry and analysis; instrumental procedures and processes used in drug and chemical analysis. Prerequisites: Fifth year standing, Physics 211, 212, 213 and Pharmaceutical Chemistry 432 and 462. 4 hours.

540. Qualitative Organic Tests (1+3). Lectures and laboratory combined to demonstrate the tests for identification of organic drugs and chemicals official in the U.S.P. and N.F. Prerequisites: Chemistry 233 and Pharmaceutical Chemistry 462. (el) 2 hours.

550. Chemistry Problems. The title and character of the course depends upon the problem; introductory research work. Open to fifth year students only. (Note special requirements for all problem courses.) (el) 1-3 hours.

DEPARTMENT OF BIOLOGIC SCIENCES

(Department 303)

All students are required to complete at least three quarters of physiology. A description of these courses is listed under Biology, elsewhere in this catalog. These courses are prerequisite to the professional courses in pharmacology.
103. **Introductory Microbiology (3+2).** Fundamentals of general and medical microbiology, with some consideration of anti-infection agents. Enrollment limited to students of nursing. Prerequisite: Elementary biology and chemistry. 4 hours.

301-302. **Introduction to Medical Microbiology I, II (3+3).** Fundamentals of microbiology, especially as related to health professions; immunity, pathogenicity, microbial diseases of man and domestic animals, and methods for prevention and treatment of such diseases. Prerequisite: One year of general biology, or botany-zoology (one year’s study of either type). 4 hours each. Formerly 401-402.

303. **Biological Sources of Drugs (4+3).** The origin, biosynthesis, methods of preparation, chemical and physical traits, and principal uses of drugs and pharmaceutical necessities obtained from organisms. Prerequisites: One year of general biology or botany-zoology; organic chemistry. 5 hours.

421. **Introduction to Pharmacology (3+0).** Abnormal physiology, organic pathology, principles and nomenclature of prevention, diagnosis, pathogenesis, prognosis and therapy; general concepts of pharmacodynamics. Prerequisites: Anatomy, physiology, and general chemistry. 3 hours.

422-423. **Pharmacodynamics I-II (3+3).** Drugs classed according to actions and uses in man. Laboratory work, usually coincidental with assigned reading and discussion of the same class of drugs, consists of observations of drug action in man and laboratory animals. Prerequisites: Biology 331-332-333 and Chemistry 231-232-233, or equivalents in physiology and organic chemistry; and Biol. Sci. 421. 4 hours each.

461. **Parasitology.** The principal protozoan, arthropodal, and helminthic infestations of man and domestic animals are discussed. Prerequisite: Biol. Sci. 302. (el) 2 hours.

462. **Virology.** Viral and rickettsial infections menacing to the health of man and animals in relation to diagnosis, treatment and control procedures. Prerequisite: Biol. Sci. 302. (el) 2 hours.

501. **Toxicology (3+3).** The pathophysiology, symptomatology, causes, prevention, and treatment of poisonings as they occur in agriculture, food preparation industry, households, and medical practice, with some consideration of toxicity testing in the development of new nutritional and pharmaceutical products. Prerequisite: Biol. Sci. 423 or equivalent. 4 hours.
502. **Principles and Practices of Public Health** (3+0). Individual and community aspects of public hygiene; epidemiology and prophylaxis of accidents and violence; the major types of illness (nutritional, metabolic, mental, infectious, environmental, occupational). Prerequisites: Introductory medical microbiology; toxicology; elementary statistics. 3 hours. Formerly Biol. Sci. 323.

550. **Undergraduate Research in Biological Sciences** (1+1-3). Training in the documentation, manipulative and intellectual skills of investigation in the biologic science areas of interest in pharmacy. Prerequisite: The introductory course in the area of special interest, and consent of the instructor concerned. (el) 1-3 hours.

**SPECIAL NOTICE**

As stated earlier, the pharmacy curriculum, because of rapid developments in the medical and allied professions, is constantly being reviewed by the faculty. The College of Pharmacy reserves the right, without advance notice, to change the content, duration and sequence of any course included in the curriculum leading to the accepted degree. A separate catalog or bulletin covering current course content and other pertinent matters is issued periodically. Please address requests for copies to the **Dean of Pharmacy, Ohio Northern University, Ada, Ohio 45810**.
College Of Law

EUGENE N. HANSON, Dean

In addition to the colleges whose courses are listed in this catalog, Ohio Northern University also maintains a College of Law on its campus. This college is accredited by the American Bar Association and is a member of the League of Ohio Law Schools and the Association of American Law Schools. It offers a three-year program leading to the degree of Juris Doctor. Its graduates are eligible to take the bar examination in all of the states by virtue of its accreditation by the American Bar Association.

The College of Law requires that all entrants have a Bachelor's degree. Inquiries concerning eligibility for admission and requests for the Law School catalog should be directed to the Dean of the College of Law.

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Public Relations
Evening Division
Housing, Placement, Scholarships,
Student Aid, Student Activities,
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Director of Admissions
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Vice President for Development
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Transcripts and Academic Records

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The Ohio College Association

The Department of Education of the State of Ohio

The University Senate of The Methodist Church

The Engineers' Council for Professional Development

The American Bar Association

The American Association of University Women

The American Association of Colleges for Teacher Education

The Ohio State Board of Registration for Professional Engineers and Surveyors

The American Association of Colleges of Pharmacy

The League of Ohio Law Schools

The Council on Social Work Education

The Association of American Law Schools
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