College of Liberal Arts
THE GEORGE FRANKLIN AND SARAH CATHERINE GETTY

College Of Liberal Arts

DONALD JAY MAXWELL, Dean.

DIVISIONS AND DEPARTMENTS

FINE ARTS: Art; Music; Speech and Theater.

HUMANITIES: English; Foreign Languages; Philosophy and Religion.

MATHEMATICS AND NATURAL SCIENCES: Biology; Chemistry; Mathematics; Physics.

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

TEACHER EDUCATION: Education; Health and Physical Education; Industrial Arts.

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 work who are recommended by the high school principal. Twelve of these units shall be as follows: four units in English; two units in Mathematics (including algebra and plane geometry); six units in History, Social Studies, Languages or Natural Sciences, or any combination thereof.

Acceptable scores on the College Entrance Examination Board tests are expected of all incoming students. The English Composition (EN) Achievement Test of the CEEB is required, also. The Mathematics Level I Achievement Test is suggested for students interested in science areas.

Students are encouraged to take 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 on campus during their senior year, or during the summer preceding their senior year.
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: The courses listed below constitute the GENERAL EDUCATION UNITS required of all students. They are listed by academic divisions; optional alternate disciplines within the division are indicated.

FINE ARTS
Art 100 or Music 100
Speech 100 or Theater 105

SOCIAL SCIENCES
Psychology 100 or Sociology 105
History 100 or Political Science 105
Economics 100

MATHEMATICS AND
NATURAL SCIENCES
Mathematics 100
Biology 100
Chemistry 100 or Physics 100

TEACHER EDUCATION
Education 100

HUMANITIES
English 100, 101, 102
Philosophy 100
Religion 105
Foreign Language 100, 101
or 102, 103 or 104, 105 or 106, 107

In order to add depth to the GENERAL EDUCATION UNITS, it is further required that the student complete two additional courses in each academic division. These two courses must be in a discipline in which the student has completed the GENERAL EDUCATION UNIT; however, the choice of the discipline belongs to the student. Additional course requirements in the Teacher Education Division are excepted for students taking departmental majors. In the area in which a major is being taken the student will fulfill the additional course requirements in that division as a normal part of his major curriculum.

If it is a departmental requirement or if the student so desires, completion of the sixth quarter of a foreign language may substitute for the Foreign Language GENERAL EDUCATION UNITS. In addition this would serve to complete the two additional courses required in the Humanities Division.

Neither credit hours nor letter grades are assigned to the GENERAL EDUCATION UNITS. Four of these courses would constitute a normal academic load for one quarter and the student will be evaluated on the basis of "CR" (competency achieved) and "NC" (competency not achieved).
The basic courses in English must be scheduled in the first three quarters of matriculation.

The Major. The candidate for a degree must complete in a logical sequence a major of not less than forty-five quarter hours. 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 must satisfy professional education requirements and will have a member of the Department of Education for a professional adviser.

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

Art
Biology
Business Administration
Chemistry
Economics
Elementary Education
English
French
German
History
Health and Physical Education
Industrial Arts
Mathematics
Music
Philosophy
Philosophy and Religion
Physics
Political Science
Psychology
Religion
Sociology
Spanish
Speech
Theater

TEACHER CERTIFICATION

Ohio Northern University is vitally concerned with the preparation of effective, efficient teachers. Consequently, complete certification programs are offered within the degree requirements in almost every department. (See Department of Education listing for details.)

Students preparing to teach must make formal application to the Teacher Education Program by the end of the sophomore year. The student must maintain a 2.25 quality point average in his major field, and have completed 75% of prescribed freshman and sophomore course work. The Teacher Education Committee, representing all Divisions of the College of Liberal Arts, considers applications for admission to the program.

All students preparing to teach are assigned advisers in the Department of Education to assist with scheduling of Professional Education courses. The adviser in the student's major department continues to advise the student with regard to meeting the requirements for the major.
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 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-PROFESSIONAL CURRICULA LEADING TO THE BACHELOR OF ARTS DEGREE

PRE-MEDICAL SCIENCE CURRICULA

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.

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. 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.

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.
PRE-LAW

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

COMBINATION CURRICULA

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

The Arts-Engineering Program is a five-year curriculum for the superior student challenged by the rewards of understanding more fully both human society and current technology. The student enrolls simultaneously 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-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.

GENERAL REGULATIONS

1. The student may not register for more than eighteen 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 eighteen scheduled hours (or equivalent) including physical education.

2. All new students in the College of Liberal Arts are required to take 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 offices of the department chairmen. 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. The faculty adviser will assist the student in planning this major not later than the last quarter of the second year.

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

5. Seniors selecting “100” courses should consult the Department Chairman and the Dean of the college for permission.

6. Students of Sophomore rank are not permitted to take 300/400 courses unless it is recommended by the student’s adviser and approved in writing by the Chairman of the Department concerned.

7. Juniors and seniors are expected to schedule a majority of their courses from the “300” and “400” group.

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

9. With the permission of the Instructor and the Department Chairman, any course prerequisite may be waived.

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.
PROBATION

A quality point average of 2.0 is necessary for graduation.

If a student's accumulative quality point average falls below 2.0 or if he fails to complete successfully within one of as many GENERAL EDUCATION UNITS as he attempts within a given quarter, the student 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.

Any student on probation whose work for the following quarter continues below the standard described above may have his record reviewed by the Scholarship Committee of the College and may be recommended to the Dean for suspension.

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 invited by the Department chairman. The committee may include one member of the faculty outside the division of the student's major interest. Notation of the completion of the Senior Comprehensive Examination will be made on the official transcript, designating the field in which it was given, with an indication of "Completed," "Passed," or "Passed with Distinction."

GRADUATION

To graduate with the Bachelor of Arts degree, the student must complete a MINIMUM of 16 GENERAL EDUCATION UNITS, plus 130 quarter hours of academic work (including 3 quarter hours in 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 considered to be minimum residence requirements for all students.
THE DEPARTMENTAL COURSES

ART

(DEPARTMENT 151)
ASSOCIATE PROFESSORS GORDON, WEST; ASSISTANT PROFESSORS DEVORE, GRIMES (Chairman).

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. It is on this premise that the student majoring in art: (1) receives as broad an understanding of art as 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; (4) develops personal modes of expression in the media of the visual arts; and (5) acquires an awareness of and competency in other academic disciplines.

A comprehensive examination in art and a public exhibition of the student’s studio work is prerequisite for graduation with a major in art.

Requirements for certification in Art Education are described under Education in this catalog.
100. ART. Analysis of the visual arts through selected works from the past and present. Illustrated lecture. One unit.

114-115. ART FOR ELEMENTARY TEACHERS. For prospective classroom teachers with emphasis on theory, media, and techniques. Lecture and studio. 114 3 hours. 115 3 hours.

151. DRAWING I. Introduction to methods and media of drawing. Required of all art majors. 2 hours.

152. DRAWING II. Extended problems of rendering in line and tone, studies in perspective. 3 hours.

153. DRAWING III. Continuation of Drawing II. Experimentation with drawing media and techniques. 3 hours.

161. DESIGN I. Introduction to, and application of, the elements and principles of plastic and graphic design. Required of all art majors. 3 hours.

162. DESIGN II. Organization of elements and principles in three dimensions. 2 hours.

163. DESIGN III. Organization of elements and principles in three dimensions. 2 hours.

210. FIGURE DRAWING. Drawing and anatomical study of the human figure. May repeat for credit to total of 12 hours. 3 hours.

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

222. LETTERING. Basic letter forms; emphasis on proportion, theory, rendering technique, and applications of lettering in commercial art. May repeat for credit once. Prerequisites: Art 151 and 163. 3 hours.

250. PAINTING. Techniques, and modes of painting in various media. May repeat for credit to total of 12 hours. 3 hours.

270. RELIEF PRINTMAKING. Woodcut, linocut, wood engraving and other relief techniques. May repeat for total of 6 hours. 3 hours.

280. SERIGRAPH PRINTMAKING. Methods and techniques. May repeat for total of 6 hours. 3 hours.

305. ANCIENT/MEDIEVAL ART HISTORY. Art forms and styles from prehistoric times to the 14th century. 3 hours.

315. RENAISSANCE AND BAROQUE ART HISTORY. Art forms and styles during the 15th, 16th, and 17th centuries in Italy and Northern Europe. 3 hours.

325. IMPRESSIONISM AND POST IMPRESSIONISM ART HISTORY. Emphasis on developments in French Art between the Revolution of 1784 and 1900. 3 hours.

335. CONTEMPORARY TRENDS ART HISTORY. Emphasis on appearances, and development of basic artistic expressions from beginning of 20th century to the present. 3 hours.
350. Ceramics. Methods and techniques of forming, decorating, glazing, and firing clay bodies; slab, wheel-thrown, and cast. Permission of instructor. May repeat for total of 12 hours. 3 hours.

360. Sculpture. The design and rendering of sculptural forms in a variety of media and techniques. Prerequisites: 15 hours of courses in Art Department. May repeat to total of 12 hours. 3 hours.

370. Lithograph Printmaking. Methods and techniques. Prerequisites: Art 153, 163, and 3 hours of 210. May repeat to total of 6 hours. 3 hours.

380. Intaglio Printmaking. Methods and techniques of etching and engraving. Prerequisites: Art 153, 163, and 210. May repeat to total of 6 hours. 3 hours.

410. Advanced Ceramics. Directed study. May repeat to total of 12 hours. Prerequisite: 6 hours of 350. 3 hours.

415. Advanced Printmaking. Directed study. May repeat to total of 12 hours. Prerequisite: 6 hours of printmaking. 3 hours.

420. Advanced Painting. Directed study. May repeat to total of 12 hours. Prerequisite: 6 hours of 250. 3 hours.

425. Advanced Sculpture. Directed study. May repeat to total of 12 hours. Prerequisite: 6 hours of Art 360. 3 hours.

457. Art Education Methods. Laboratory-seminar dealing with materials techniques, and methods of classroom instruction in art. Meets professional education requirement in methods area. 3 hours.

489. Senior Thesis. Required of all Art Majors. Preparation for and evaluation of the comprehensive examination and exhibit. Arrangements for this course must be made one quarter in advance with the student's major adviser and the department chairman. 1 hour.

490. Special Topics in Art. 1-3 hours.

494. Seminar in Art. 1-3 hours.

497. Independent Study in Art. 1-3 hours.

Biology

(Department 121)

Professors Bowden (Chairman), Chester, Meyer; Associate Professors Butler, Dawson, Laing, Tipple; Assistant Professors Gidwani, Hoch, Nelson; Instructors Hollis, Keiser; Assistant Instructors Hostetler, Schick.

The objectives of the department are to develop in each student an understanding of the nature and content of the sciences with biology as an example and an understanding of the relevance of biology to the society of which he is a citizen. Biology 100 is a course designed to attain these objectives. It also provides the generalizations by
which the advanced courses can be related to one another and is therefore prerequisite to all other courses in the curriculum. Students desiring further knowledge of general biology may take Biology 112 and 113 which develop an understanding of microbial, plant and animal life and inheritance. These courses also provide a firm foundation for advanced work in biology and the related applied sciences.

Additional requirements for majors are:

Biology 112, 113, 195, 201 or 202, 223, 301, 331, 343, 430, 431, 495 and fifteen (15) credit hours elected from: 201, 202, 213, 290, 297, 302, 303, 332, 333, 350, 423, 490, 495, 497, microbiology 361, 362 (offered in the College of Pharmacy).

Preparation in the related area of mathematics, statistics, chemistry and physics as determined by the department in consultation with the individual student. (A minimum of 25 hours beyond the basic course requirements of the College of Liberal Arts including statistics and at least a one year sequence in chemistry.)

A comprehensive examination.

Department advisers will aid students who have selected Biology as a major in choosing relevant electives.

100. **Biology.** Biological principles and concepts of plant and animal life, stressing their application to man. **One unit.**

112-113. **General Biology.** Biological principles and concepts of plant and animal life, stressing their application to man. Prerequisite: General Biology 100. **8 hours.**

Alternate 112-113. **General Biology.** Independent Study Program. The student’s rate and method of study are given maximum independence under department supervision. Consult the chairman. Prerequisites: General Biology 100. **8 hours.**

195. **Seminar.** Readings, discussions and reports on problems of historical and current interest in biology. Required of all prospective Biology majors. **1 hour.**

201. **Development in Seed Plants (2 + 4).** A quantitative and developmental approach to the life history of the seed plant emphasizing the interactions of structures and processes. Prerequisite: General Biology 112. **4 hours.**

202. **The Seed Plant As An Organism (2 + 4).** The interactions of structures and processes in the vegetative stage of the life history of the seed plant. Prerequisite: General Biology 112. **4 hours.**

213. **Natural History (1 + 6).** Recognition and identification of local biotic communities and their inhabitants. Field study emphasized. No prerequisite. **3 hours.**

223. **Invertebrate Zoology (2 + 4).** Invertebrate relationships including morphology, physiology, life cycles and taxonomy. Prerequisite: General Biology 113. **4 hours.**

231-232-233. **Anatomy and Physiology (2 + 3).** Basic principles of human body structure and function. Prerequisite: General Biology 113. **9 hours.**

290. **Special Topics in Biology.**

297. **Introduction to Biological Investigations.** Minor investigations for qualified freshmen and sophomores. **1 hour.**
301, 302, 303. Developmental Anatomy (2 + 5). Biological principles involved in embryonic development, the structural changes and the resulting functional modifications of the vertebrates. Prerequisites: General Biology 113, 12 hours.

331. Physiology (3 + 3). A structural and functional approach to the human body including physiological principles at the cellular, tissue and organ-system level. Prerequisites: General Biology 113, one year of chemistry. 4 hours.

332-333. Physiology (3 + 3). A structural and functional approach to the human body including physiological principles at the cellular, tissue and organ-system level. Prerequisite: Physiology 331, Chemistry 233. 8 hours.

341, 342, 343. Techniques and Instrumentation (1 + 3). Principles and procedures used in biological investigations. Open to juniors majoring in biology. 3 hours.

350. Radiation Biology (2 + 3). The common forms of ionizing radiation, their interaction with matter and their effect on living organisms. Prerequisite: Two years of biology, one year of chemistry. 3 hours.

423. Ecology (2 + 3). The distribution, abundance and productivity of organisms interacting among themselves and with their nonliving environs. Prerequisite: Proficiency in elementary mathematics, statistics and quantitative life history studies or Biology 201, statistics. 3 hours.

430. Genetics. The principles of genetics as exemplified by microorganisms, higher plants and animals. Mendelian, biochemical, developmental and population genetics are considered. Prerequisite: Biology 113, one year of chemistry, statistics. 3 hours.


490. Special Topics in Biology. 1-3 hours.

495. Seminar in Biology. 1-3 hours.

497. Independent Study in Biology. 1-3 hours.

Business Administration and Economics

(Department 131)

Professor Conklin (Chairman); Associate Professor Cooley; Assistant Professors Ammon, Carlson, Kniffen; Instructors Bissey, Webster, Young; Lecturers DaPore, Gearity, Whitmer.

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 two areas of concentration, Accounting and Management.

A student majoring in the department must complete a minimum of 45 hours in the department including courses 131, 132, 133, 202, 203, 322, 352, 353. In addition, students majoring in Economics and Business Administration are required to complete Mathematics 142 and 143, Probability and Statistics. Seniors should take a senior seminar in preparation for the senior comprehensive.

100. ECONOMICS. The origins, characteristics, and functions of our economic organization. Current institutional arrangements, the use of appropriate tools of economic analysis; relevant economic and social goals. One unit.

131-132-133. PRINCIPLES OF ACCOUNTING. Basic concepts and standards in accounting; their application to service, trading, and manufacturing concerns. The periodic determination of income, preparation of working papers and financial statements, flow of financial data, and financial analysis. 9 hours.

202. PRINCIPLES OF MICROECONOMICS. Economics of the individual firm in the free market economy; competitive and monopolistic markets. How prices ration goods and services to users, and the principles on which the total product is divided among the owners of factors of production. Actual cases from business. Prerequisite: Economics 100. 3 hours.

203. PRINCIPLES OF MACROECONOMICS. Forces that determine the behavior of national income and output, unemployment, and the price level. Rudiments of money and banking, monetary and fiscal policy, growth and development. Selected issues of contemporary social relevance. Prerequisite: Economics 100. 3 hours.

301-302. INTERMEDIATE ACCOUNTING. Income measurement and recognition. The accounting cycle, matching process, financial statement presentation and actuarial mathematics as applied to accounting problems. Prerequisite: Accounting 133. 6 hours.

312. COST ACCOUNTING. Job order, process, and standard cost systems. Controls for material, labor, and overhead. Methods of cost allocation. Joint and by-product costs. Flexible budgets and the development of cost parameters. Prerequisite: Accounting 133. 3 hours.

322-323. BUSINESS LAW. Legal aspects of common business transactions, contracts, sales and commercial papers. Business associations, their legal rights and responsibilities in agency, partnerships and corporations; governmental regulation of these relationships. 6 hours.

330. PRINCIPLES OF MANAGEMENT. The organization of firms. Modern management methods, decision making processes, procedures, physical equipment and standards. Organization and managerial relationships of major industrial functions. Prerequisite: Economics 202-203. 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. Prerequisite: Economics 202-203. 3 hours.
351. Marketing. Management-oriented; concepts, processes, and problems of marketing; channels of distribution, marketing research, brands and price policies. Prerequisite: Economics 202-203. 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 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. Prerequisite: Economics 202-203. 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. Prerequisite: Economics 202-203. 3 hours.

370. Managerial Accounting. Use and interpretation of accounting data in controlling and planning business activities and decision making. Business problems examined from the point of view of internal management. Prerequisite: Cost Accounting 312. 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. Prerequisite: 202-203. 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. Prerequisite: Economics 202-203. 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. Prerequisite: Economics 202-203. 3 hours.

381. 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. 3 hours.

383. Intermediate Microeconomic Theory. Special problems of pricing, production, and distribution under perfect competition, oligopoly, duopoly, and monopoly in the American economy. Prerequisite: Economics 202-203. 3 hours.

384. Intermediate Macroeconomic Theory. The principles, measurement, analysis, and control of aggregate economic activity; the role of consumption, investment and saving in achieving a full-employment out-put, economic growth, and price stability. Prerequisite: Economics 202-203. 3 hours.

385. 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. Prerequisite: Economics 202-203. 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.

403-404. **Auditing.** Auditing accounting records and statements, techniques of verifying financial statement items, preparation of working papers, and the writing of audit reports for a complete audit. Prerequisite: Intermediate Accounting 302. 6 hours.

411. **Comparative Economic Systems.** A comparative study of capitalism, socialism, and communism with emphasis on the economics of pricing, production, and distribution under these systems. A specific and empirical examination of these systems in actual use, as in the United States, Russia, Great Britain and China. Prerequisite: Economics 202-203. 3 hours.

413. **Budgeting.** Relationship of budgeting to management functions; principles and procedures of profit planning and financial control for both, manufacturing and non-manufacturing organizations. Prerequisite: Managerial Accounting 370. 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. Prerequisite: Economics 202-203. 3 hours.

432. **Accounting Information Systems.** Theory and procedure for designing, installing, and maintaining accounting information systems for collecting, recording, analyzing, and presenting financial data. Prerequisite: Intermediate Accounting 301-302. 3 hours.

433. **Data Processing.** To prepare managers to understand electronic data processing equipment and its uses. Prerequisite: Management 330. 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. **Economic History of the United States.** Economic life in colonial America and the East-West migration; the development of modern business and industry in the United States; the corporation and its part in the nation's growth; the causes and consequences of the great depression. 3 hours.

443. **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. 3 hours.

461. **Investments.** Problems of investment policy: types of investment risks, the analysis of investment requirements, and types of investment policies. Problems of both individuals and institutional investors. Prerequisite: Corporation Finance 362. 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. Prerequisite 202-203. 3 hours.

490. **Special Topics in Economics.** 1-3 hours.
491. Special Topics in Management. 1-3 hours.
492. Special Topics in Accounting. 1-3 hours.
494. Seminar in Economics. 1-3 hours.
495. Seminar in Management. 1-3 hours.
496. Seminar in Accounting. 1-3 hours.
497. Independent Study in Economics. 1-3 hours.
498. Independent Study in Management. 1-3 hours.
499. Independent Study in Accounting. 1-3 hours.

CHEMISTRY
(Department 122)
Professors Bettinger (Chairman), Wilhelm; Associate Professors Haight, McClure; Assistant Professors Godwin, Hawbecker, Hildahl; Instructor Putnam; Lecturer Jonard.
The objective of this department is to help serve the modern cultural need for an understanding of science in our modern society, to provide the basic preparation in chemistry for those who plan to enter the chemical industry, the teaching profession, pursue graduate study in chemistry or related fields, and to serve those who need an understanding of the fundamentals of this physical science as a prerequisite to various professional studies.

MAJOR IN CHEMISTRY

A. For those who wish the basic major in preparation for medicine, secondary school teaching, sales or management, patent law, scientific communication and information retrieval or any other chemistry related field: Chemistry 152, 153, 241, 242, 243, 251, 324, 341, 342, 343, 349; one course from 304, 375 or Biochemistry 341 (offered in the college of Pharmacy); and one additional chemistry course.

B. Recommended for those who wish a professional major or intend to pursue graduate study. Chemistry 152, 153, 241, 242, 243, 251, 304, 324, 334, 341, 342, 343, 375, 461, 462, 475, 494 and two of the following units: I Chemistry 473, II Chemistry 474, III Chemistry 481-482-483 or Chemistry 497 for three hours, IV an advanced mathematics or physics course approved by the department.

100. CHEMISTRY. Orientation to and understanding of the fundamental nature of Chemistry; models and measurements. One unit.

112-113. GENERAL CHEMISTRY. A continuation from Chemistry 100. Fundamental principles and use of modern theory and periodic relationships to explain observable facts. The laboratory illustrates principles in a quantitative manner and involves the study of ions in aqueous solution. (3 + 3). Prerequisite: Chemistry 100. 4 + 4 hours.

152-153. GENERAL CHEMISTRY FOR MAJORS. The same lecture and laboratory as Chemistry 112-113 (3 + 3). Prerequisite: Chemistry 100. 4 + 4 hours.

231-232-233. ORGANIC CHEMISTRY. Organic compounds, applying the modern approach to bonding, structure, methods of synthesis and mechanisms of reactions. The laboratory program emphasizes procedures, syntheses and modern methods of separation and identification of organic compounds. (3 + 3). Prerequisite. Chemistry 118. 4 + 4 + 4 hours.

241-242. ORGANIC CHEMISTRY FOR MAJORS. The same lecture and laboratory as Chemistry 231-232. (3 + 3). Prerequisite: Chemistry 153. 4 + 4 hours.

243. ORGANIC CHEMISTRY FOR MAJORS. The same lecture as Chemistry 233 with separate laboratory; qualitative organic analysis and the use of modern instrumentation in the separation and identification of organic compounds. (3 + 6). Prerequisite: Chemistry 242. 5 hours.

251. CHEMICAL ANALYSIS. Basic principles and techniques and laboratory applications of quantitative elemental analysis. (1 + 6). Prerequisite: Chemistry 113 or 153. 3 hours.

290. SPECIAL TOPICS. 1-3 hours.
304. **Organic Synthesis.** Modern methods of organic synthesis; multi-step processes and the more difficult synthetic procedures. (1 + 6). Prerequisite: Chemistry 233 or 243. 3 hours.

324. **Intermediate Inorganic Chemistry.** Preparations, properties and reactions of elements and their compounds in terms of modern concepts. The laboratory involves the application of fundamental techniques to the synthesis of compounds and the systematic study of their properties and reactions. (2 + 3). Prerequisite: Chemistry 251. 3 hours.

334. **Chemical Literature.** Types of chemical literature available and their use; literature searching and preparation of scientific papers. Laboratory consists of actual library problems. (1 + 3). Prerequisite: Chemistry 232 or 242. 2 hours.

341. **Physical Chemistry I.** Fundamentals, primarily thermodynamics. (3 + 0). Prerequisite: Physics 231, 232, 233; Math 252 or 341; and Chemistry 113 or 153. 3 hours.

342-343. **Physical Chemistry II, III.** Fundamentals: kinetics, quantum theory and structure of matter. Laboratory illustrates the principles. (3 + 3). Prerequisite: Chemistry 233 or 243, 251, and 341. 4 + 4 hours.

375. **Advanced Preparations and Techniques I.** Advanced preparative and analytical techniques; the use of modern instrumentation to characterize substances. (1 + 6). Prerequisite: Chemistry 324. Corequisite: Chemistry 343. 3 hours.

451. **Advanced Inorganic Chemistry.** Chemical principles and bonding theory applied to the study of inorganic system. (4 + 0). Prerequisite: Chemistry 324, 334 and 343. 4 hours.

462. **Advanced Analytical Chemistry.** The theory of instrumental analysis. (3 + 0). Prerequisite: Chemistry 324, 334 and 343. 3 hours.

473. **Advanced Topics in Physical Chemistry.** (3 + 0). Prerequisite: Chemistry 334, 343 and a reading knowledge of German (Taught in alternate years). 3 hours.

474. **Theoretical Organic Chemistry.** (3 + 0). Deals at an advanced level with the relationship of structure and reactivity of organic compounds including reaction mechanisms. Prerequisite: Chemistry 304, 334, 343 and a reading knowledge of German (Taught in alternate years). 3 hours.

475. **Advanced Preparations and Techniques II.** (0 + 6). Prerequisite: Chemistry 375, 451, 462 and reading knowledge of German. 2 hours.

481-482-483. **Senior Research I, II, III.** Prerequisite: Chemistry 324, 334, 343, a reading knowledge of German and approval of chairman required. 2 + 2 + 1 hours.

490. **Special Topics in Chemistry.** 1-3 hours.

494. **Seminar in Chemistry.** Required of all chemistry majors. Corequisite: Chemistry 341. 1-3 hours.

497. **Independent Study in Chemistry.** 1-3 hours.
EDUCATION

(Department 141)

Professors Hanson, Miller, Spencer; Associate Professors Rubeck, Van Atta, Vayhinger (Chairman); Assistant Professors Ellery, Hungerford, Parsons; Instructors Smith, Traxler; Lecturers Allen, Bachman, Behrens, Lloyd, Perry, Rutledge.

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. Required of all students in Education:

A. Formal application for admission to the Teacher Education Program after the completion of 75% of freshman and sophomore work.

B. For acceptance:
   1. An accumulative average of 2.25 in major field.
   2. Favorable recommendations from advisors, major department, Dean of Women or Men, and Health Department.
   3. Action by the Liberal Arts Committee on Teacher Education.

Students preparing to teach at either 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 requirements in an area of concentration under the direction of the appropriate chairman.

1. ELEMENTARY EDUCATION

a. Provisional Elementary Certificate

Professional Education requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Education 100—Education</td>
<td>3</td>
</tr>
<tr>
<td>Education 223—Child Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Education 233—Children's Literature</td>
<td>3</td>
</tr>
<tr>
<td>Education 308—Teaching Mathematics</td>
<td>3</td>
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<tr>
<td>Education 309—Teaching Science</td>
<td>3</td>
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<tr>
<td>Education 311—Teaching Social Studies</td>
<td>3</td>
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<tr>
<td>Education 312—Teaching Language Arts</td>
<td>3</td>
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<tr>
<td>Education 341—Teaching Reading</td>
<td>3</td>
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<tr>
<td>Education 381—Elementary School Curriculum</td>
<td>3</td>
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<tr>
<td>Education 470-471—Student Teaching</td>
<td>15</td>
</tr>
<tr>
<td>Electives in Education</td>
<td>9</td>
</tr>
</tbody>
</table>

TOTAL

Education 100 + 48 hours
b. Dual-Elementary Education major with teaching field in Secondary Education
   (See Department of Education for course requirements)

2. SPECIAL CERTIFICATION—ELEMENTARY AND SECONDARY

a. Art Education
   Provisional Special Certificate. See Chairman of Department of Art for program of studies.
b. Health and Physical Education
   Provisional Special Certificate. See Chairman of Department of Health and Physical Education for program of studies.
c. Music Education
   Provisional Special Certificate. See Chairman of 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.
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 the department’s chairman before qualifying for student teaching.

Professional Education requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Education 100—Education</td>
<td>One unit</td>
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<tr>
<td>Education 224—Adolescent Psychology (Prereq: Psych. 100)</td>
<td>3 hours</td>
</tr>
<tr>
<td>Education 370—School and Society</td>
<td>3 hours</td>
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<tr>
<td>Education 380—Secondary Curriculum</td>
<td>3 hours</td>
</tr>
<tr>
<td>Education 450—Secondary Methods of Teaching or Special Methods of Teaching</td>
<td>3 hours</td>
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<tr>
<td>452 English</td>
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<tr>
<td>453 Social Studies</td>
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<tr>
<td>454 Mathematics</td>
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<tr>
<td>455 Science</td>
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<td>456 Language</td>
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<tr>
<td>457 Art</td>
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<tr>
<td>Music 313</td>
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<tr>
<td>Industrial Arts 423</td>
<td></td>
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<tr>
<td>Education 480-481-482—Student Teaching</td>
<td>9 or 15 hours</td>
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<tr>
<td>Electives in Education</td>
<td>3 or 0 hours</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
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<tr>
<td>Education 100 + 24 or 27 hours</td>
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</table>

Electives from the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education 313—Educational Psychology</td>
<td>3 hours</td>
</tr>
<tr>
<td>Education 350—Audio-Visual Aids</td>
<td>3 hours</td>
</tr>
<tr>
<td>Education 401—History and Philosophy of Education</td>
<td>3 hours</td>
</tr>
<tr>
<td>Education 402—School Organization &amp; Administration</td>
<td>3 hours</td>
</tr>
<tr>
<td>Education 460—Evaluation and Measurement</td>
<td>3 hours</td>
</tr>
</tbody>
</table>
Secondary Certification programs are offered in the following areas:

- Biology
- Bookkeeping-Basic Business
- Comprehensive Social Studies
- Comprehensive Science
  - (Chemistry, Physics, Biology)
- English
- Health and Physical Education
- History and Government
- Industrial Arts
- Languages; French, German, Spanish
- Mathematics
- Physical Science (Chemistry, Physics)
- Speech

GENERAL COURSES

100. EDUCATION. Areas of competence essential for participation as a citizen in decision making for education: the changing role of the school, the learner and the learning process, values that give direction to education, current issues in education. One unit.

313. EDUCATIONAL PSYCHOLOGY. The learning process and conditions that promote learning. Prerequisite: Psychology 100. 3 hours.

350. AUDIO-VISUAL AIDS IN EDUCATION. Preparation, study, and evaluation of audiovisual materials; their uses in the promotion of the learning process. 3 hours. (Formerly Ed. 430)

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 the United States Democracy. 3 hours.

402. SCHOOL ADMINISTRATION AND ORGANIZATION. The United States public school system, its organization and administrative units, and other agencies through which it is managed. The teacher's role in the organization of a school system. 3 hours.

420. CURRICULUM IMPROVEMENT. Individual and group problems growing out of students' own school situations. 3 hours.

460. EVALUATION AND MEASUREMENT OF PUPIL PROGRESS. Evaluation and measurement as they apply to instruction. 3 hours.

490. SPECIAL TOPICS IN EDUCATION. 1-3 hours. (Formerly Ed. 440)

494. SEMINAR IN EDUCATION. 1-3 hours.

497. INDEPENDENT STUDY IN EDUCATION. 1-3 hours.

ELEMENTARY EDUCATION COURSE DESCRIPTION

223. CHILD PSYCHOLOGY. 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 100. 3 hours.

233. CHILDREN'S LITERATURE. Knowledge and appreciation of children's books. Audiovisual aids, up-to-date study, critical aids and enjoyment of representative selections are utilized. 3 hours.
308. **Teaching Mathematics in the Elementary School.** Content, methods, and materials reflecting the current emphasis in mathematics. Development of functional relationships with other curriculum areas. Prerequisite: 9 hours college math and Education 223. 3 hours.

309. **Teaching Science in the Elementary School.** The role of science in childhood education, the preparation of materials, and organization of learning activities for problem solving. Prerequisite: 12 hours of college science and Education 223. 3 hours.

311. **Teaching Social Studies in the Elementary School.** Objectives, trends, issues, and evaluation of the teaching of social studies relative to the concepts and principles underlying the disciplines of the social sciences. Prerequisite: Education 223. 3 hours.

312. **Teaching Language Arts in the Elementary School.** Principles and methods of teaching language arts including oral and written expression, handwriting, spelling, and creativity in relation to other subjects in the curriculum; the preparation and evaluation of language arts materials. Prerequisite: Education 223. 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. 3 hours. Offered 1969-70.

340. **Primary Methods and Materials.** Programs and practices in the primary grades. 3 hours.

341. **Teaching Reading in the Elementary School.** Materials and principles underlying the teaching of reading including new concepts, readiness, phonics, word analysis, silent and oral reading, vocabulary development, and comprehension; preparation and evaluation of reading materials. Prerequisite: Education 223. 3 hours.

381. **The Elementary School Curriculum.** An overview of the elementary school program, conceptions of teaching in harmony with basic psychological principles. Prerequisite: 6 hours of elementary methods courses. 3 hours. (Formerly Ed. 391)

410. **Education of Slow Learning Children.** Introductory; developmental growth and learning characteristics; etiology; diagnosis and differentiation; teacher and learner problems in education. 3 hours.

411. **Language Arts for Slow Learning Children.** Methods, materials for functional communication skills. 3 hours.

412. **Mathematics and Science for Slow Learning Children.** Methods, materials for basic mathematic and science concepts; practical application. 3 hours. Offered 69-70.

413. **Social Studies for Slow Learning Children.** Problems and deviations in civic, social and cultural behavior and adequacy. 3 hours.

414. **Occupational Orientation and Job Preparation for Slow Learning Children.** Emphasis on employable skills and occupational and personal adequacy. 3 hours. Offered 69-70.
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.

441. **Advanced Reading Methods and Materials.** Advanced study of the reading process, comprehension and speed, skills; prevention and treatment of individual problems. Prerequisite: Education 341. 3 hours.

470-471. **Student Teaching in the Elementary Grades.** Planning and teaching under supervision in the elementary grades; weekly seminar on campus. Prerequisites: senior rank; average of 2.25 or higher with no grade in any Education 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"; Ed. 100, 223, 308, 309, 311, 312, 341; 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. 6, 9, or 15 hours.

**SECONDARY EDUCATION COURSES**

224. **Adolescent Psychology.** The adolescent, his physical, social, emotional, and intellectual development; in accordance with genetic constitution and environmental forces from birth. Prerequisite: Psychology 100. 3 hours. (Formerly Ed. 333)

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. Prerequisite: Education 224. 3 hours.

380. **The Secondary School Curriculum.** Secondary school curriculum standards, practices, instructional materials, curriculum development, curriculum functions, changes and trends. Prerequisite: Education 224. 3 hours. (Formerly Ed. 390)

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. Prerequisite: Ed. 224.

452. **Teaching Methods in High School English.** Similar to Education 450 with emphasis on the student's major teaching area. 3 hours. Prerequisite: Ed. 224.

453. **Teaching Methods in High School Social Studies.** Similar to Education 450 with emphasis on the student's major teaching area. 3 hours. Prerequisite: Ed. 224.

454. **Teaching Methods in High School Mathematics.** Similar to Education 450 with emphasis on the student's major teaching area. 3 hours. Prerequisite: Ed. 224.

455. **Teaching Methods in High School Science.** Similar to Education 450 with emphasis on the student's major teaching area. 3 hours. Prerequisite: Ed. 224.

456. **Teaching Methods in High School Foreign Language.** Similar to Education 450 with emphasis on the student's major teaching area. 3 hours. Prerequisite: Ed. 224.
TEACHING METHODS IN HIGH SCHOOL ART. Similar to Education 450 with emphasis on the student's major teaching area. 3 hours. Prerequisite: Ed. 224.

480-481-482. STUDENT TEACHING — JUNIOR AND SENIOR HIGH SCHOOL. Planning and teaching under supervision in the junior or senior high school five days per week in major teaching field; weekly seminar on campus. Prerequisite: senior rank; average of 2.25 or higher in major area plus education, with no grade in any Education course lower than "C"; a scholarship average of 2.25 or higher in required courses in the subject matter sequence with no grade lower than "C"; Education 100, 224, 370, 450 or Special Methods; 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 and by the chairman of his major department. 6, 9, or 15 hours.

ENGLISH
(DEPARTMENT 112)

PROFESSORS DORNBUSCH (Chairman), HASTINGS; ASSOCIATE PROFESSORS BENNETT, PRICE; ASSISTANT PROFESSORS T. BANKS, BELCH, OLIVER, STURDEVANT, THOMAS; INSTRUCTORS FLEMING, HAGEN, HUNT, MATTHEW, E. MILLER; LECTURERS J. DORNBUSCH, NUBER.

OBJECTIVES:

The courses in English are designed to help the student demonstrate an awareness of style and the ability to express himself maturely, clearly, concisely; understand generally the symbolic process of language and particularly the structure and usage of the English language; read critically and creatively as a regenerating means of gathering, understanding, evaluating, and enjoying recorded human experience; comprehend the growth and continuity of Western ideas and confront the humanizing values of the Western World through the study of literature; be able to analyze a piece of literature by applying some of the techniques of the specialist; respect and understand the techniques of research and the accomplishments of scholarship in the discipline of English; and recognize the relationship of language and literature to other areas of knowledge. Advanced courses increasing the breadth and depth of the above objectives are offered to majors who plan to teach in the public school or do graduate study.

To meet the 45-hour minimum for a major in English, the following courses are required:

  200
  205 or 305 and 206 or 306 (Majors are encouraged to choose 305, 306.)
  311-312-313
  321
  Two of the following: 322, 323, 324
  Two of the following: 337, 338, 339
  351-352
  410
  494 or 495
Also required are one year of English History and either (1) Intermediate French or German or (2) three courses in philosophy beyond Philosophy 100. The major is, however, strongly urged to take both the intermediate language and the three courses in philosophy.

100, 101, 102 do not count toward a major in English.

ENGLISH COURSES

100. ENGLISH. Critical thinking and writing based upon studies in fiction. One unit.

101. ENGLISH. Critical thinking and writing based upon studies in drama. Prerequisite: English 100. One unit.

102. ENGLISH. Critical thinking and writing based upon studies in poetry. Prerequisite: English 101. One unit.

English 100, 101, 102 are prerequisites for all other courses in English (unless otherwise noted).

200. PRINCIPLES OF LITERARY CRITICISM. The theory of literature and critical approaches applied to specific works in the various genres. 3 hours.

205. MAJOR WRITERS BEFORE 1700. Selected works of ancient classical writers, Chaucer, Shakespeare, and Milton. 3 hours.

206. MODERN MASTERS OF LITERATURE. Selected major writers from 1700 to the present. 3 hours.

250. JOURNALISM ACTIVITIES — NEWSPAPER.

251. JOURNALISM ACTIVITIES — MAGAZINE.

252. JOURNALISM ACTIVITIES — YEARBOOK.
Supervised work on and contributions to the publication. No prerequisites. 1 hour. The student may enroll for only one activities course (1 hour) per quarter. Six hours in one area or a combination of six hours from the three areas (250, 251, 252) may be counted toward graduation.

290. SPECIAL TOPICS IN ENGLISH. 1-3 hours.

305. ANCIENT AND MEDIEVAL CLASSICS. The major literary achievements of the ancient and medieval periods and their influence on Western thought and tradition. All works will be read in English translation. 3 hours.

306. CONTINENTAL RATIONALISM AND ROMANTICISM. European literary masterpieces from the Renaissance to the mid-nineteenth century. All works will be read in English translation. 3 hours.

310. ENGLISH LITERATURE BEFORE 1500. Continuity in Anglo-Saxon attitudes and types from Beowulf to Chaucer. Epic, lyric, elegy, narrative with emphasis on mediaeval romance, and drama, all in translation. 3 hours. Alternate years.
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. 9 hours.

314. English Renaissance. Selected poetry, prose, and drama of the Elizabethan and Jacobean periods, with emphasis upon Sidney, Spenser, Donne, Marlowe, and Jonson. 3 hours. Alternate years.


322. Restoration and the Eighteenth Century. Major writers of the Neoclassical Period. 3 hours.

323. English Romanticism. Selected prose and poetry of Blake, Wordsworth, Coleridge, Byron, Shelly, and Keats. 3 hours.

324. Victorian Period. Typical Victorian attitudes, conflicts, and conditions as reflected in the major prose and poetry of the age. 3 hours.

325. Modern Poetry. An intensive study of the poems of Yeats and Eliot with an introduction to the poetry of Hopkins, Frost, Stevens, and others. 3 hours.

333. Modern Drama. Studies in such fields of contemporary drama as realism, neoromanticism, impressionism, and expressionism. 3 hours.

337. American Literature: Beginnings. Chronological study of the development of American Idealism and Rationalism with emphasis on the organic continuity of Western thought in the major writers of the 17th and 18th centuries. 3 hours.

338. American Renaissance. Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, and their contemporaries. 3 hours.

339. American Realism and Naturalism (1865-1918). The decline of romanticism and the rise of realism and naturalism in American literature with emphasis on the works of such representative authors as Howells, Twain, James, Crane, and Dreiser. 3 hours.

341. Poetry Writing. The discipline and technique of writing poetry. 3 hours. May be repeated up to 6 hours.

342. Fiction Writing. The discipline and technique of writing fiction. 3 hours. May be repeated up to 6 hours.

343. Factual Writing. The discipline and technique of writing exposition and argument. 3 hours. May be repeated up to 6 hours.

351-352. The English Language. The historical development of the English language and an introduction to modern linguistics. 6 hours.

361. British Novel I. Development of the novel as a literary form from Defoe to George Eliot. 3 hours. Alternate years.
362. BRITISH NOVEL II. Development of the modern novel as a literary form from Hardy to the present. 3 hours. Alternate years.

363. CONTEMPORARY AMERICAN FICTION. The development of the American novel after World War I with emphasis on the major novelists. 3 hours. Alternate years. Offered 1969-70.

381. HISTORY OF LITERARY CRITICISM. Movements and major writers of literary criticism. 3 hours. Alternate years. Offered 1969-70.

382. BIOGRAPHY. Origins, development, and art of biography and allied forms, including autobiography, memoirs, diaries, and letters. Representative major classic, romantic, and critical lives of distinguished contributors to Western culture. 3 hours. Alternate years.

383. HISTORY OF IDEAS. A study of the continuity of ideas as they are found embodied in literature. 3 hours. Alternate years.

410. CHAUCER. 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.

490. SPECIAL TOPICS IN ENGLISH. 1-3 hours.

494. SEMINAR IN ENGLISH LITERATURE. 1-3 hours.

495. SEMINAR IN AMERICAN LITERATURE. 1-3 hours.

497. INDEPENDENT STUDY IN ENGLISH. 1-3 hours.

FOREIGN LANGUAGES
(Department 113)

PROFESSOR GATES (Chairman); ASSOCIATE PROFESSOR WETHERILL; ASSISTANT PROFESSORS ANIDO, MARTINEZ, NAGY, PELLER, SAGONOWSKY; ASSISTANT INSTRUCTOR SCHMITZ; LECTURER F. PRICE.

The foreign language program is designed to train students to speak, read and write a foreign language, to insure a strong background in the literature and culture of the people whose language they are studying; to train teachers of foreign languages at the secondary level; to prepare students for graduate work in the languages.

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 and Spanish 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.
Requirements for a major in a foreign language:
For a major in French, German or Spanish 45 hours, taken in logical sequence, are required above the 100 level course series. The sequences are as follows:

French 211-212-213; 311-312-313; 314-315-316; 411-412-413; 490.
German 221-222-223; 321-322-323; 324-325-326; 421-422-423; 491.
Spanish 241-242-243; 341-342-343; 344-345-346 (or: 347-348-349); 441-442-443; 492.

Other courses offered may be substituted according to the specific needs of the student.

FRENCH

100. FRENCH. A rapid presentation of the structures and patterns of French, with emphasis upon unique characteristics. The course deals with grammatical, phonological and semantic problems in meaningful context. One unit.

101. FRENCH. Outstanding contributions of French-speaking countries to the cultural heritage of the Western world in the visual arts, music, theater and literature. One unit.

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 class periods and two hours of scheduled laboratory practice per week. 12 hours.

211-212-213. INTERMEDIATE FRENCH. A review of fundamentals of grammar and pronunciation. Abundant conversational practice and composition based on short stories, plays and poetry. Occasional lectures on French life, history, architecture, art and civilization. Three class periods and two hours of scheduled laboratory practice per week. Prerequisite: 111-113, or two years of high school instruction in French. 12 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: 211-212-213. 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. Prerequisite: French 211-213, 311-313. 9 hours.

317. ADVANCED FRENCH PHONETICS. Intended for teachers and prospective graduate students. Phonemic analysis and phonetic description of French. Problems of mute e and liaison; stress, its nature and place; intonation patterns in conversation and reading of prose and poetry. Prerequisite: 311-312-313. 3 hours.

318. THE FRENCH NOVEL. An historical survey of the development of French prose fiction from the Middle Ages to the present. Special emphasis on the literary "isms" and outstanding writers in the XIX century: Stendhal, Balzac, Flaubert, Zola.

411, 412, 413. CIVILISATION FRANCAISE. 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. 9 hours.


419. FRENCH STYLISTICS. Review of essentials of French grammar geared to developing sense of historical grammar, morphology, and etymology. Vocabulary building also following these same points of reference. Problems involved in translation.

490. SPECIAL TOPICS IN FRENCH. 1-3 hours.

494. SEMINAR IN FRENCH. 1-3 hours.

497. INDEPENDENT STUDY IN FRENCH. 1-3 hours.

GERMAN

102. GERMAN. A rapid presentation of the structures and patterns of German, with emphasis upon unique characteristics. The course deals with grammatical, phonological and semantic problems in meaningful context. One unit.

103. GERMAN. Outstanding contributions of Germanic countries to the cultural heritage of the Western world in the visual arts, music, theater and literature. One unit.

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 periods and two hours of scheduled laboratory practice per 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 per week. Prerequisite: German 121-123 or two years of high school instruction in German. 12 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 per 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. 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. 9 hours.

491. Special Topics in German. 1-3 hours.

495. Seminar in German. 1-3 hours.

498. Independent Study in German. 1-3 hours.

Spanish

104. Spanish. A rapid presentation of the structures and patterns of Spanish, with emphasis upon unique characteristics. The course deals with grammatical, phonological and semantic problems in meaningful context. One unit.

105. Spanish. Outstanding contributions of Spanish-speaking countries to the cultural heritage of the Western world in the visual arts, music, theatre and literature. One unit.

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 per week. 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 hours of scheduled laboratory practice per week. Prerequisite: Spanish 141-143, or two years of high school instruction in Spanish. 12 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. 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. 9 hours.

444. Golden-Age Drama. A study of the creation of national theatre by Lope de Vega and his followers, with attention to the development of preceding forms of religious and secular drama, Italian influences, and the crystallization of the spirit of the Spanish Counter Reformation. Prerequisite: 344, 345, 346. 3 hours.


492. Special Topics in Spanish. 1-3 hours.

496. Seminar in Spanish. 1-3 hours.

499. Independent Study in Spanish. 1-3 hours.

Health and Physical Education
(Department 143)

Professors English (Chairman), Lamb; Associate Professor Roberson; Assistant Professors Ludwig, Michael; Instructors Covert, Ford, Lauth, Middleton, J. Miller, Palmisano; Assistant Instructor Layne; Lecturers McCabria, White.

Some form of physical activity is required of all undergraduate students during their first year in the University. The nature and amount of work to be taken depends upon the physical condition as revealed by a physical examination. A program of elective and required activities is provided, which aims to achieve the optimum development of the physically, mentally, and socially integrated, and adjusted individual through guided instruction and participation in selected total body sports, rhythmic, and gymnastic activities conducted according to social and hygienic standards.

A student physically unable to participate in physical education classes, or a student 27 years of age, or over, may be excused. Information may be obtained from the Chairman of the Department of Physical Education.
REQUIRED PHYSICAL EDUCATION
SERVICE COURSES

Physical Education, two hours per week. One credit each quarter for the first three quarters. Must be completed prior to senior status in Liberal Arts. None of the elective courses may be repeated.

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.

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 one (1) quarter 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.

MAJOR IN HEALTH AND PHYSICAL EDUCATION

A copy of the curriculum and the requirements for teacher certification may be obtained from the Chairman of the Department. In addition to the requirements listed in the curriculum, a physical education major is required to be affiliated in some manner with one of the major sports in the intercollegiate program.

The following courses indicated by an asterisk are required professional courses:

*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.

*141-142-143. PHYSICAL EDUCATION FOR MAJORS. (Men) Physical Education 141-143 are required of all students majoring or minoring in physical education in place of courses 001-003. Activities taught in season include speedball, touch football, games of low organization, tumbling, wrestling, trampoline, tennis and ping pong. 1 hour each.

144, 145, 146. PHYSICAL EDUCATION FOR MAJORS. (Women) Team Sports. Required of all women physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities: 144-Field hockey and soccer; 145-Basketball and volleyball; 146-Track and field and softball. 1 hour each quarter.

147, 148, 149. PHYSICAL EDUCATION FOR MAJORS. (Women) Individual Activities. Required of all women physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities: 147-Basic movement and physical fitness and exercise; 148-Badminton; 149-Tennis. 1 hour each quarter.

*201-202-203. PHYSICAL EDUCATION FOR MAJORS. (Men) Courses 201-203 are required of all students majoring in physical education in place of Courses 001 to 003. Activities taught in season include soccer, flashball, games of low organization, parallel bars, badminton, weight lifting, archery, golf, and volleyball. 1 hour each.

204, 205, 206. PHYSICAL EDUCATION FOR MAJORS. (Women) Rhythmic Activities. Required of all women physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities: 204-Rhythmic fundamentals and exercise to music; 205-Social and modern dance; 206-Folk and square dance. 1 hour each quarter.
207, 208, 209. PHYSICAL EDUCATION FOR MAJORS. (WOMEN) Individual Activities. Required of all women physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities: 207-Archery and tumbling; 208-Gymnastics, apparatus, and trampoline; 209-Recreational games and golf. 1 hour each quarter.

*222. HEALTH EDUCATION. The health program of the public schools, and the teaching of habits, attitudes and knowledge conducive to good health. 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. Prerequisites: Physiology and Anatomy 331 and 332. 3 hours.

*233. PHYSICAL EDUCATION FOR THE ELEMENTARY TEACHER. The need, purpose, and function of play in education; activities adaptable to various levels of the elementary and secondary schools. 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, one hour. 3 hours per quarter.

**Physical Education Majors are required to complete 9 of the 15** hours.

***Women Physical Education majors are required to complete 4 of the 6 hours.

**319. THE THEORY OF COACHING TRACK (MEN). Methods and forms for all of the events in track and field. Lectures, reports, demonstrations, and practice. 3 hours.

**320. THE THEORY OF COACHING WRESTLING (MEN). Equipment, fundamentals of the art and skill of wrestling. 3 hours.

**321. THE THEORY OF FOOTBALL COACHING (MEN). Equipment, fundamentals of the game, kicking, passing, handling the ball, tackling, blocking; individual position play; offensive and defensive formations; strategy and generalship. 3 hours.

**322. THE THEORY OF 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, demonstrations and practice. 3 hours.

**323. THE THEORY OF COACHING BASEBALL (MEN). Pitching, catching, batting, fielding, baserunning, individual position, and team play in baseball. 3 hours.

***324. THEORY OF COACHING FOR WOMEN. To prepare students in physical education to coach athletics in secondary schools; technique, basic principles and fundamentals of volleyball and basketball. Lectures, reports, demonstrations, and practice. 2 hours.

***325. OFFICIATING FOR WOMEN. To develop knowledge and techniques for officiating women's volleyball and basketball games. Prerequisite: Physical Education 145. 2 hours.
**326. Co-Curricular Activities (Women).** Theory and practice of the organization and administration of co-curricular activities commonly associated with the girls' physical education program. 2 hours.

331-332-333. Advanced Coaching Practice (Men). To give men students who have had Physical Education 319-320-321-322 and 323 an opportunity to do actual coaching under supervision in all sports in season. Hours arranged. 6 hours maximum toward graduation. 1-3 hours.

334-335-336. Advanced Coaching Practice (Women). To give women students who have had courses 324-325-326 an opportunity to do actual coaching under supervision in all sports in season. Hours arranged. 3-6 hours per quarter.

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 Physical Education 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.

*350. 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. Prerequisite: 1 quarter of Health or Hygiene. 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.

433. Driver Education. For those who plan to teach driving in the public schools; classes and driving demonstrations daily. 3 hours.

480. Student Teaching. See Education 480. 9 or 12 hours.

490. Special Topics in Health and Physical Education. 1-3 hours.

494. Seminar in Health and Physical Education. 1-3 hours.

497. Independent Study in Health and Physical Education. 1-3 hours.

**History and Political Science**

(Department 132)

Professors Darlington, Hilliard (Chairman), Milnar; Assistant Professors Davis, Sobers; Instructors Barker, Hammond, Ludanyi, Wood; Lecturers C. Koehn, Rossi.
HISTORY

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; political science, sociology, psychology, and economics. In addition to the 45 hours required for the major in history, the student must complete nine hours of American Government. It should be noted that Human Geography 400 and Physical Geography 433 do not count as a part of the history major. For those who plan to do graduate work, it is recommended that a greater emphasis be placed on modern foreign languages.

100. HISTORY. Concepts and trends in world history. A conceptual and thematic approach to the meaning and content of history, emphasizing man’s significant achievements. One unit.

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. 3 hours.

211. HISTORY OF THE UNITED STATES TO 1850. 3 hours.

212. HISTORY OF THE UNITED STATES: 1850 TO 1900. 3 hours.

213. HISTORY OF THE UNITED STATES: 1900 TO THE PRESENT. 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. 3 hours.

315, 316, 317. AMERICAN SOCIAL AND INTELLECTUAL HISTORY. American intellectual life from the colonial period to the present in relation to the major political, economic, religious, literary, and philosophical ideas that have affected the course of American national development. A three-quarter course. Prerequisite: History 211, 212, 213. 9 hours. (Offered in alternate years) 1970-71.

321. ENGLISH HISTORY TO 1603. 3 hours.

322. ENGLISH HISTORY: 1603 TO 1837. 3 hours.

323. ENGLISH HISTORY: 1837 TO THE PRESENT TIME. The English people in their political, social, and institutional development; the growth of the British Empire and the evolution of the British Commonwealth of Nations. 3 hours.

326. MEDIEVAL EUROPE. Europe from the fall of the Roman Empire to the beginning of the Renaissance. Special attention is given to those institutions most instrumental in shaping modern European development. Prerequisite: consent of the instructor. 3 hours.
327. THE FRENCH REVOLUTIONARY ERA. The French Revolution and Napoleon, with the philosophical background and ideological development of the period, together with their effect on later history. Prerequisite: consent of the instructor. 3 hours. (offered in alternate years) 1969-70.

328. RENAISSANCE AND REFORMATION. The political evolution of the Italian communes; the culture, art, science, and literature of the period; the Church and European society in the later Middle Ages; Luther and the expansion of Protestantism in Europe. 3 hours. (offered in alternate years) 1970-71.

331-332-333. U.S. CONSTITUTIONAL DEVELOPMENT. An historical and legal approach to the interpretation of the constitution. Prerequisite: Political Science 201-202-203, and History 211, 212, 213. 9 hours.

341-342. AMERICAN FOREIGN RELATIONS. The inception, development, and present interpretation of the outstanding foreign policies of the United States as a world power; the trend from isolation. Prerequisite: History 211, 212, 213. 6 hours. (offered in alternate years, 1969-70.

344. HISTORY OF THE MODERN MIDDLE EAST. The social, political, and economic evolution of Turkey, Iran, and the Arab world from 1800 to the present. 3 hours. (offered in alternate years) 1969-70.

351, 352. ANCIENT HISTORY. The development of civilization from prehistory to the fall of the Roman Empire. Emphasis is placed upon the early pre-Greek Oriental civilization and the cultural and political contributions of the period. 6 hours.

353. LATIN AMERICAN HISTORY. Colonial Latin America. 3 hours.

354. LATIN AMERICAN HISTORY. Latin America in the 19th and 20th century. The conditions in Spain and Portugal leading to colonization; the growth of cultural and political institutions of Latin America; the struggle for independence and the rise of the modern Latin American republics. Prerequisite: consent of the instructor. 3 hours. (offered in alternate years) 1970-71.

362. RECENT AMERICAN HISTORY. An intensive study of the major factors in United States history since 1928. Prerequisite: History 211, 212, 213. 3 hours.

365. THE NEGRO IN AMERICAN HISTORY. The African background; the buildup of the black population in America; contributions to the political, economic, and intellectual scene. 3 hours (To be given 1970-71.)

367. HISTORIOGRAPHY. Great historians; the technique of historical research, criticism, and writing. Required of history majors. 3 hours.

368. HISTORY OF EAST ASIA. Japan, China, and the Philippines from 1850 to the present; political, social, and cultural changes. Prerequisite: consent of the instructor. 3 hours. (offered in alternate years) 1969-70.

369. HISTORY OF SOUTHEAST ASIA. Burma, Thailand, Malaysia, Indonesia, and India from 1850 to the present. Prerequisite: consent of the instructor. 3 hours. (offered in alternate years) 1969-70.
374, 375, 376. Recent European History. Europe since 1878: 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. (offered in alternate years) 1969-70.

381. The Westward Movement in the United States. Territorial expansion from colonial times to 1860; Indian relations; land policies; transportation and trade. 3 hours. (offered in alternate years) 1969-70.

382. The Westward Movement in the United States. A continuation of 381; the advance of the frontier in the Trans-Mississippi West; the influence of the West on American ideals and institutions. 3 hours. (offered in alternate years) 1969-70.

400. Human Geography. The interaction of man and his physical environment. 3 hours.

411, 412, 413. Russian History. Russia from Peter the Great to the present; economic and social development, political and religious traditions, revolutionary developments, post-war USSR and Russia in European affairs. 9 hours. (offered in alternate years) 1970-71.

433. Physical Geography. World geography; a study and unification of the body of knowledge encompassing the earth sciences which give general insight into the nature of man's physical environment. 3 hours.

490. Special Topics in History. 1-3 hours.

494. Seminar in History. 1-3 hours.

497. Independent Study in History. 1-3 hours.

Political Science

The major in political science will be prepared for graduate study in this field, for the study of law, for entrance into the public or foreign service, or for effective participation in politics as a citizen. Majors are advised to pursue courses in related social science disciplines such as economics, history, psychology, and sociology. For those entering graduate study or foreign service, extensive work in foreign languages is strongly urged. In addition to the 45 hours of political science required of the major, US History 211, 212, 213, must be taken.

105. Political Science. Fundamental concepts of governmental systems, including the basic sources of governmental policies and the process of implementation. One unit.

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

210. Basic Approaches and Methods in Political Science. Major concepts, issues, and methods in the study of politics. Emphasis is on current research to enable the student to select and design a research project. Prerequisite: Political Science 201-202-203. 3 hours.
312. **Urban Government.** Problems of urban, suburban, and metropolitan government in the United States. Prerequisite: Political Science 201-202-203, or consent of the instructor. 3 hours. (offered in alternate years) 1969-70.

334-335-336. **Comparative Government.** A structural-functional comparison of: Democratic political systems of the Western World, including Britain and the major democracies of continental Europe (334); Communist political systems, including those of the Soviet Union, Yugoslavia and China (335); underdeveloped or "developing" political systems, including those of India and Mexico (336). Prerequisite: Political Science 201-202-203. 9 hours. (offered in alternate years) To be given 1970-71.

345. **Conduct of American Foreign Relations.** Major factors related to the formation of foreign policy; problems of constitutionalism and federalism; roles of the various departments of the executive branch of government, to Congress, and to the influence of pressure groups. Prerequisite: consent of the instructor. 3 hours. (offered in alternate years) 1969-70.

347. **American Political Parties.** The leadership, organization, activities, and role of the major political parties in the American political process. Prerequisite: Political Science 201-202-203. 3 hours.

363-364. **Public Administration and Organization.** The nature and function of public organizations; structure, management, and control. Prerequisite: Political Science 202-202-203. 6 hours.

371. **International Relations.** The forces which determine the policies of nation-state and their organizations in the international setting. 3 hours.

372. **International Organization.** The objectives, structures, agencies, and procedures of international organization, with special emphasis on general-purpose institutions like the United Nations and regional-functional organizations like the European Common Market and the OAS. 3 hours.

373. **International Law.** Development of the law governing the relationship among states; its nature, sources, and applications; international agreements, state responsibilities, and the laws of force and war. 3 hours.

384-385-386. **Western Political Thought.** Ancient, medieval and Renaissance pre-Socratic to Machiavelli (384); Modern—Luther and Calvin to Marx and Nietzsche (385); American political thought—pre-Revolutionary to the 20th century (386). Prerequisite: Political Science 201-202-203. 9 hours. (offered in alternate years) given in 1969-70.

391. **Public Opinion and Interest Groups.** The formation, characteristics, and role of public opinion in the American political process, particularly in relation to interest groups and their activities. Prerequisite: Political Science 201-202-203. 3 hours. (offered in alternate years) given in 1970-71.

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. (offered in alternate years) given in 1970-71.
INDUSTRIAL ARTS

(Department 142)

Professor Kain (Chairman); Assistant Professor Rex; Instructor Guilford.

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 profes-
sional-technical education for persons preparing to teach the arts of industry and technical subjects in the public schools.

Courses are offered that are of value to both men and women students concentrating in other fields. The recommended courses are: 200 Arts and Crafts, 310 Handicrafts for Teachers, 241 Finishing Methods and Materials, 311 Graphic Arts, 323 Lapidary and Jewelry, 330 Photography, 460 Industrial Materials and Processes, 490 Special Topics in Industrial Arts.

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.

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

An orientation course (110, 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.

110. 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. 3 hours.

111. TECHNICAL DRAWING I. Use of instruments, applied geometry, lettering, orthographic projection, and pictorial drawing. 3 hours.

112. TECHNICAL DRAWING II. Continuation of 111. Drawing Developments, intersection, and working drawings. Projects in the main fields of engineering are used. Prerequisites: Technical Drawing 111. 3 hours.

113. DRAWING. Emphasis on an awareness of design as it is applied to fabrication and construction, using typical industrial materials. Selected exercises in the development of design as applied to a particular function and material. Study and practice in relating good design to furniture, architecture, interiors, graphics, crafts, and to its application in the manufacture of industrial products. 3 hours.

200. ARTS AND CRAFTS. Laboratory experiences in working with craft materials: copper, brass, aluminum, wood, plastics, leather, gemstones, textiles, ceramics and others. 3 hours.
213. **Wood Technology.** First in a series of three courses devoted to wood-working; 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 shrinkage, methods of preservation and beautification; wood fabrication and joining techniques. 3 hours.

310. **Handicrafts for Teachers.** To introduce prospective elementary teachers to the basic hand tools and their proper manipulation in simple constructional activities. Practical unit development, subject integration. 3 hours.

311. **Graphic Arts.** The manipulation processes of duplicating written communications: process printing, mimeographing, spirit duplicating, photographs, blueprinting, block printing, etching, letterpress and offset printing. 3 hours.

313. **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.

321. **Metalwork Technology.** Fundamentals of general metalwork; layout and pattern drafting, bending, forming, seaming, soldering, resistance and oxyacetylene 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 and offset press operations. Prerequisite: Graphic Arts 331. 3 hours.

323. **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. 3 hours.

330. **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.

331. **Furniture Design and 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. Prerequisites: Industrial Arts 110, 112, 113. 3 hours.

332. **Metal Machining and Manufacturing.** 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.

341. **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.

343. **Welding Theory and Practice.** Welding theory, and weld types; welding metallurgy; electrical resistance and arc welding, oxyacetylene welding, brazing, and burning; welded metal fabrications. 5 hours.
350. **CERAMICS.** (See Department of Art, Ceramics 350.)

353. **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, Industrial Arts 110, 112. 3 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 161-162. 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 423 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.

451. **Automotives and Power Mechanics.** The construction and operating principles of the modern motor vehicle; methods of maintaining and repairing engines through scientific methods of diagnosis. 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, factories and other manufacturing firms. 5 hours.

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

490. **Special Topics in Industrial Arts.** 1-3 hours.

494. **Seminar in Industrial Arts.** 1-3 hours.

497. **Independent Study in Industrial Arts.** 1-3 hours.

**MATHEMATICS**

(Department 123)

Professor Berton (Chairman); Assistant Professors D. Daly, K. Kuhns, E. Lhamon, J. Liu, C. Roeder; Instructors Carpenter, Evans, Frank, Jenkins, Taussig, Tayim; Lecturers Hayes, Price.

The department offers courses designed to complement almost all disciplines in the University. Students should check the departmental curriculum in which they are considering majoring to determine the best choice of mathematics courses.

In general, the sequence 100-172-173 is designed for prospective elementary school teachers; the sequences 100-142-143-147-148 and 100-147-148-142-143 are designed for
prospective social and life scientists, and the "calculus" sequence 161-162-152-153-251-252 is designed for prospective engineers, mathematicians and physical scientists.

The beginning course of the "calculus" sequence for each individual freshman will be determined on the basis of the student's achievement in high school and on the basis of the college entrance examinations, especially the mathematics achievement examination. Advanced placement is encouraged.

Mathematics 100, as part of the general requirements, must be passed by all students. Students who take the "calculus" sequence should take Mathematics 100 concurrently with one of the courses of the "calculus" sequence, or should, after completing the "calculus" sequence and some study of the topics of mathematics 100, pass the course by special examination for credit.

Students majoring in mathematics must complete 45 credit hours in mathematics. They must complete Mathematics 252 and then complete at least 25 credit hours in mathematics courses at the 300/400 level including 311, 321, 351, 421 and one of the following two course sequences: 312-313, 422-423, 452-453. Physics 231-232-233 are also required as part of the mathematics major. All mathematics courses to be counted toward the major must have been completed with a grade of C or better.

All mathematics majors are encouraged to take Digital Computer 101 and 102 in the College of Engineering early in their program.

100. Mathematics. Mathematical logic, set theory, the essence of a proof, permutations and combinations. One unit.

142. Probability and Statistics 1 (with 143), formerly Math. 193). Frequency distributions, measures of central tendency and dispersion, probability, binomial distribution, normal distribution, and student's t-distribution. Prerequisite: Mathematics 100, or 162 or its equivalent in high school work. 3 hours.

143. Probability and Statistics 2 (with 142, formerly Math. 193). Nonparametric statistics, linear regression, correlation, chi-square distribution, index numbers, time series, F-distribution, and analysis of variance. Prerequisite: Mathematics 142. 3 hours.

147. Introductory Calculus 1 (with 148, formerly Math. 192). Limits, continuity, differentiation of algebraic functions, implicite differentiation, applications of differentiation. Prerequisite: Mathematics 100, or 161 or its equivalent in high school work. 3 hours.

148. Introductory Calculus 2 (with 147, formerly Math. 192). Summations, antiderivatives, the definite integral, the fundamental theorem of calculus, area between curves, exponential and logarithmic functions, techniques for integration, applications of integration. Prerequisite: Mathematics 147. 3 hours.

151. Elementary Functions. The real number system; inequalities; radicals and exponents; exponential; logarithm; trigonometric and inverse trigonometric functions, theory of equations, systems of equations, binomial theorem, and sequences. 5 hours. (This course will not be offered on the Ada campus.)

152. Analytic Geometry. Cartesian coordinates, distance, slope, loci problems, lines, circles, conic sections, transformations, curve sketching, parametric equations, polar coordinates, 3 dimensional coordinates, planes in 3 dimensions. Intuitive limits and differentiation. Prerequisite: Mathematics 151 or 162 or its equivalent in high school work. 5 hours.
153. **Calculus 1.** Intuitive integration, limits and continuity, differentiation of algebraic functions, implicit differentiation, applications of differentiation, theorem of the mean, graphing functions, differentials, definite integral, indefinite integrals, area, differentiation, and integration of trigonometric and exponential functions. Prerequisite: Mathematics 152 or Analytic Geometry in high school. 5 hours.

161. **Elementary Functions 1** (with 162, formerly 151). The real number system; inequalities, radicals, and exponents; exponential and logarithmic functions; right triangle trigonometry; and theory of equations. 3 hours.

162. **Elementary Functions 2** (with 161, formerly 151). Trigonometric and inverse trigonometric functions; systems of equations; permutations and combinations; binomial theorem; mathematical induction; and sequences. Prerequisite: Mathematics 161 or its equivalent in high school work. 3 hours.

172. **Fundamental Mathematics 1.** Relations, theory of arithmetic, systems of numeration, integers. Prerequisite: Mathematics 100. 3 hours.

173. **Fundamental Mathematics 2.** Real numbers, order relations, exponents, logarithms, introduction to analytic geometry. Prerequisite: Mathematics 172. 3 hours.

245. **History of Mathematics** (Formerly 320). The origin and growth of mathematics concepts, with emphasis on the development of ideas but with personal glimpses of some of the men who made major contributions. (To be offered on alternate years 1969-70). Prerequisite: Mathematics 252. 3 hours.

251. **Calculus 2.** Parametric equations, polar coordinates, methods of integration, applications of integration, solid analytic geometry, vectors in three dimensions. Prerequisite: Mathematics 153. 5 hours.

252. **Calculus 3.** Indeterminate forms, series, partial differentiation, multiple integration. Prerequisite: Mathematics 251. 5 hours.

311-312-313. **Abstract Algebra 1, 2 and 3** (Formerly 350 and 451). Rings, integral domains, fields, real and complex numbers, groups, polynomials, ideals, vector spaces, systems of linear equations, determinants, linear transformations and matrices. (To be offered on alternate years 1970-71). Prerequisite: Mathematics 252. 9 hours.

321. **Introduction to Topology and Analysis** (Formerly 443). Set theory; composition, inverses, restriction and extension of functions; metric spaces; continuity; open and closed sets; limits; products, subspaces, and equivalence of metric spaces. Prerequisite: Mathematics 252. 3 hours.

322. **Point Set Topology.** Topological spaces, neighborhoods, closure, interior, continuity, homeomorphism, connectedness, homotopic paths, compactness Bolzano-Weierstrass property. (To be offered on alternate years, 1970-71.) Prerequisite: Mathematics 321. 3 hours.

323. **Combinatorial Topology.** Complexes, Betti Groups, barycentric subdivisions, invariance of Betti groups, continuous mappings and fixed points. (To be offered on alternate years 1970-71). Prerequisite: Mathematics 322. 3 hours.
331. **Computer Concepts** (Formerly 305). Definitions, flow and control of information, coding, machine arithmetic, number systems, machine languages, logical construction, memory devices control unit, input, output. (To be offered on alternate years 1970-71). Prerequisite: Engineering 201-101 and Mathematics 252. 3 hours.

341. **Differential Equations 1 and Calculus.** Sequences, infinite series, Taylor’s formula with remainder and content of mathematics 351. Prerequisite: Mathematics 243. 5 hours.

351. **Differential Equations 1.** Ordinary differential equations of the first order, linear differential equations with constant coefficients, simultaneous linear differential equations, applications, vector algebra. Prerequisite: Mathematics 252. 5 hours.

352. **Differential Equations 2.** Fourier series, finite differences, Laplace transformations, partial differential equations, Bessel functions and Lagendre 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.

381-382. **Advanced Statistics 1 and 2** (Formerly 382). Probability spaces, random variables and sampling multivariate distributions, law of large numbers, estimation of parameters, central limit theorem, confidence intervals, regression sampling and testing hypothesis. (To be offered on alternate years 1969-70). Prerequisite: Mathematics 252. 6 hours.

421-422. **Foundations of Geometry 1 and 2** (Formerly 310). Incidence, ordering, separation, and congruence, as they are involved in non-Euclidean, incidence, affine and Euclidean geometries. (To be offered on alternate years 1969-70). Prerequisite: Mathematics 252. 6 hours.

423. **Projective Geometry.** Projectivities, perspectivities, perspective triangles, quardrangular sets, harmonic sets, duality fundamental theorem and Pappus’ Theorem Polarities, the Conic finite projective plane, parallelism, coordinates. (To be offered on alternate years 1969-70). Prerequisite: Mathematics 252. 3 hours.

461. **Numerical Analysis** (Formerly 405). Finite differences, interpolation, polynomial expansions, iterative methods, determinants matrices, eigenvalues, integration formulas, numerical solution of differential equations. (To be offered on alternate years 1970-71). Prerequisite: Mathematics 341 or 351. 3 hours.

452-453. **Real Analysis 1 and 2.** Functions, topological ideas, order properties and LUB property, sequences, continuity, uniform continuity, limits of functions, discontinuities, mean value theorem, the definite integral, Taylor’s theorem, set functions, uniform convergence, the Gamma function. (To be offered on alternate years 1969-70). Prerequisite: Mathematics 321. 6 hours.

490. **Special Topics in Mathematics.** 1-3 hours.

494. **Seminar in Mathematics.** 1-3 hours.

497. **Independent Study in Mathematics.** 1-3 hours.
MUSIC
(Department 152)

Professor Roeder (Chairman); Associate Professor Weitz; Assistant Professors Lasko, Sonntag; Instructors Doudna, Lautenbach, Weidow; Lecturers Crist, Firszt, Margoni.

BACHELOR OF ARTS DEGREE

Major performance area 30 hours
*Piano proficiency 18 hours
Theory of Music 9 hours
Historical approach to Music Literature 4 hours
Conducting (General conducting and techniques) 6 hours
Participation in a performing group 0 hour
Senior recital

APPLIED MUSIC
†020. Voice.
021. Piano.
022. Organ.
023. Strings.
024. Woodwinds.
025. Brasses.
026. Percussion.

* Piano proficiency will be required of all students. Two years of Class Piano should bring the student to the proficiency required. When proficiency is attained, Class Piano will no longer be required. Piano and Organ majors should meet proficiency without taking the Class Piano listing.

† All Voice majors will be required to take one quarter of a second foreign language in addition to the basic General Education Unit. This may be waived if the student has had a year of foreign language in High School (French or German).
Section 01—Class Instruction. 1 hour per quarter.

Section 02—Individual Instruction. Freshman and Sophomore Years. 2 hours per quarter.

Section 03—Individual Instruction. Junior and Senior Years. 3 hours per quarter.

Section 04—Individual Instruction. Senior Year, including Recital. 4 hours per quarter.

**035. CHORUS-CHOIR.** All qualified University students are given the opportunity to sing in the University Chorus-Choir. Music of all types, accompanied and a cappella, is studied and performed throughout the year. Chapel participation and the use of sacred and secular music for concerts both on and off campus are included in the program. Non-music major students are permitted a maximum of 6 hours credit. 1 hour per quarter.

**036. COLLEGIUM MUSICUM.** A choral organization of selected voices for the study and performance of music from all periods of music history. 1 hour per quarter.

**040. BAND.** All qualified University students who play band instruments are given the opportunity to play in the University Band. The best music literature for band performance is included in the repertoire. The band appears in concert both on and off campus and supports other University events. Non-music major students are permitted a maximum of 6 hours credit. 1 hour per quarter.

**045. ORCHESTRA.** All qualified University students who play orchestral instruments are urged to participate in the Lima Symphony Orchestra. Enrollment is subject to audition. Non-music major students are permitted a maximum of 6 hours credit. 1 hour per quarter.

050. VOCAL ENSEMBLE. Selected ensemble of vocal students for the study and performance of suitable literature. 1 hour per quarter.

056. “OHIO-N'S” STAGE BAND. Selected ensemble of instrumental students for the study and performance of characteristic literature. 1 hour per quarter.

057. THE WOODWIND CHOIR. Selected ensemble of woodwind instrumental students for the study and performance of characteristic literature. 1 hour per quarter.

058. THE BRASS CHOIR. Selected ensemble of brass and percussion instrumental students for the study and performance of characteristic literature. 1 hour per quarter.

059. THE STRING ENSEMBLE. A group of string instrumentalists studying and performing characteristic literature. 1 hour per quarter.

**All voice and keyboard majors will be required to participate in Choir and/or Collegium for three years. These students will receive no credit for participation, but will have participation considered in their applied grade.

***All instrumental majors will be required to participate in the Band or Orchestra for three years. They will receive no credit for this participation, but will have participation considered in their applied instrument grade.

Credit will be given music majors for participation in all other ensembles other than Band, Choir, or Orchestra, as listed above.
COURSES IN MUSIC

100. Music. Historical approach to music literature from beginnings of Western Civilization to the present. Style analysis, visual and aural, of representative compositions, within historical context of each epoch. One unit.

112. Music for the Elementary Classroom Teacher. Music activities, music materials, and literature, unit planning and teaching methods and skills for the classroom teacher—grades K-6. Prerequisite: Music 100. 3 hours.

122-123. Theory of Music. 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. Prerequisite: Music 100. 3 hours per quarter.

131-132-133. Ear Training. Sight singing, dictation, and keyboard harmony to supplement the theory of music program. 1 hour per quarter.

212. Counterpoint. Understanding of and the technical ability for contrapuntal writing. 3 hours.

214. Form and Analysis. An analytical study of the various musical forms of representative music literature. 3 hours.

216. Contemporary Theory. Complex intervals, rhythms and chordal structure including non-chordal tones used in composition from 1900 to the present day. 3 hours.

301. Conducting. General conducting techniques. 2 hours.

304. Vocal Conducting. Choral literature and the technique of its direction. 2 hours.

305. Instrumental Conducting. Instrumental literature and the technique of its direction. 2 hours.

313. Secondary Music 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.

314. Elementary Music Methods (Music Education Majors). Music techniques, teaching procedures, and the use of materials and instruments in the elementary grades; for music teachers and supervisors. 3 hours.

351-352-353. Historical Approach to Music Literature. The historical development of Music Literature; early Greek and Roman eras, Renaissance, Baroque, Classical and Romantic periods, Twentieth Century Music and contemporary American composers. 3 hours per quarter.

411. Choral Literature. Choral materials, sacred and secular, with consideration for programming and performance. 2 hours.

412. Band Literature. Instrumental materials with consideration for programming and performance of the concert and marching bands. 2 hours.
413. Applied Field Literature. Music literature in the area of the student’s performance field for study and pedagogy. 2 hours.

441-442-443. Instrumental Methods Classes (String, Woodwind, Brass, and Percussion Instruments). Group instruction for the music major student in the techniques of performance on the various instruments of the band and orchestra including the study of materials and literature primarily at the public school level. 2 hours per quarter.

490. Special Topics in Music. 1-3 hours.

494. Seminar in Music. 1-3 hours.

497. Independent Study in Music. 1-3 hours.

PHILOSOPHY AND RELIGION

(Department 115)

Professors Colloms, Tinsler (Chairman); Associate Professor Hinderliter; Assistant Professors Becker, Hodges, Whipple.

RELIGION

The major in Religion requires a minimum of 45 quarter hours in the department beyond Religion 105, including Religion 254, 255, 256; 352, 353, 361; and 454, 461, 463. Independent Study 498, seminars, and electives in Religion, plus up to three courses in Philosophy, complete the requirement.

PHILOSOPHY

The major in Philosophy requires a minimum of 45 quarter hours in the department and three of the following courses beyond Philosophy 100, including 234, 238, 241, 244, 245, 246. Also required is the sequence 432, 433, 441. Independent Study 497, seminars, electives and up to three courses in Philosophy complete the requirement.

INTERDISCIPLINARY MAJOR

The interdisciplinary major in philosophy and religion requires a minimum of 45 hours in the department, with the student completing the Sophomore and Junior requirements in both disciplines (see above) with independent study, and electives on the Senior level to complete the requirement.

For those planning to attend seminary or graduate school, two years of foreign language is strongly advised.

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 eval-
uated. The goal is the achievement of principles of sound reasoning in connection with the living issues of both personal and social life.

100. PHILOSOPHY. What philosophy is and what it attempts to do; the problem of knowledge, the nature of man and of his environment, and the principles for establishing proper relationships between man and his economic, social, and political environments. One unit.

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

238. ETHICS. A critical study of the various moral theories developed in the Western world in the attempt to formulate a standard for moral behavior applicable to individuals and social groups. 3 hours.

241. AESTHETICS. The theories relating to the creation, appreciation and critical evaluation of the various fine arts, and of the various theories of beauty and the related aesthetic experience. 3 hours.

244. PRAGMATISM AND AMERICAN CULTURE. The major theories of Pragmatism, selected writings of Peirce, James, and Dewey; the influence of this school of philosophy on liberalism, democracy and freedom, jurisprudence, education, and religion. 3 hours.

245. EXISTENTIALISM. The historical roots of existentialism in Kierkegaard and Nietzsche and the thought of Heidegger, Sartre, and other representative figures. 3 hours.

246. PHILOSOPHY OF RELIGION. The religious concepts of God, soul, freedom, prayer, destiny, evil, and immortality and the underlying metaphysical assumptions. 3 hours.

331. THE CLASSICAL GREEK AND ROMAN PHILOSOPHERS. The Pre-Socratics, Plato, Aristotle, and Hellenistic philosophy through Neo-Platonism. 3 hours.

332. MEDIEVAL AND RENAISSANCE PHILOSOPHY. The development of philosophy from St. Augustine to Francis Bacon. 3 hours.

333. MODERN PHILOSOPHY. The study of philosophy beginning with Descartes through the Nineteenth Century. 3 hours.

432. AMERICAN PHILOSOPHY. The main currents of philosophical thought in America from the Colonial Period to the present; Royce, Santayana, and Whitehead. 3 hours.

433. PHILOSOPHY OF HISTORY. Leading theories of history as reflected in the writings of philosophers from ancient times to the present; the nature of history and historical knowledge. 3 hours.

441. PHILOSOPHY OF SCIENCE. The concepts and assumptions of the scientific method, the relations of philosophy and science, the impact of modern scientific developments on metaphysical speculations. 3 hours.

449. PHILOSOPHICAL ANALYSIS. Recent and contemporary theories of epistemology that limit knowledge to statements of observable data and their interrelations, and the study of the meaning and function of language. 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.

105. RELIGION. A non-sectarian study of religion, and its nature and function in the modern Western world. Illustrations of basic concepts and principles of religion are taken mainly from Judaism and Christianity, the chief religions of our western culture. One unit.

254. THE BEGINNINGS OF ISRAEL. The development of the history and religious thought of the ancient Hebrews from Abraham through the fall of Jerusalem and the work of Jeremiah. 3 hours.

255. THE LATER OLD TESTAMENT COMMUNITY. Religious and historical developments beginning with Ezekiel through the Roman period, with special attention to the Qumran community and the Dead Sea scrolls. 3 hours.

256. THE BEGINNINGS OF CHRISTIANITY. The events and interpretations surrounding the lives of Jesus, Paul, and the other Christian leaders of the first century. 3 hours.

261. ARCHAEOLOGY AND THE BIBLE. The methods and conclusions of archaeological studies in the Middle East as related to the Bible. 3 hours.

262. CHRISTIANITY AND CULTURE. An examination of various interpretations of the relationship of Christianity to particular cultural phenomena, including literature, science, philosophy, psychology, and the economic and political orders. 3 hours.

263. 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. 3 hours.

PHILOSOPHY OF RELIGION. 3 hours. (See Philosophy 246.)

352. CHURCH HISTORY TO THE REFORMATION. The Apostolic Age to the Council of Constance with emphasis on the theology of the Church Fathers, Augustine and Aquinas. 3 hours.

353. CHURCH HISTORY FROM THE REFORMATION THROUGH THE NINETEENTH CENTURY. A history of the church and the theological developments of both Protestantism and Roman Catholicism. 3 hours.

361. CONTEMPORARY CHRISTIAN THOUGHT. Basic issues, major theological positions, and representative theologians of twentieth century Christian thought. 3 hours.
454. Asian Religions. The major living religions of the Orient. 3 hours.

461. Studies in the Synoptic Gospels. The results of historical and literary criticism and their theological consequences. An attempt to answer the question, “What can we know of the historical Jesus?” 3 hours.

463. The Life and Letters of St. Paul. An historical reconstruction with emphasis on the theology of the Epistles. 3 hours.

491. Special Topics in Religion. 1-3 hours.

495. Seminar in Religion. 1-3 hours.

498. Independent Study in Religion. 1-3 hours.

PHYSICS

(Department 124)

Professor Abele (Chairman); Associate Professors Gangemi, Weimer; Assistant Professors T. L. Liu, Messick, 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 complete 57 hours beyond Physics 100 in his major field, should follow the sequence and obtain the prerequisites for the advanced courses as determined by the department. Physics majors in education must complete 45 hours in his major field.

The basic curriculum for concentration in physics can be obtained from the department chairman.

100. Physics. For Liberal Arts students. Basic laws and principles which govern the behavior of nature; perspective and orientation for life in a highly science-oriented world. Topics in Physics and Astronomy. One unit.

190. Seminar. Reading, discussion and reports on problems of historical and current interest in physics. 1 hour.

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.

For pre-medical, pre-dental, pre-pharmacy and secondary education students. (3 + 2).

211 should precede 212 and 213. Prerequisite: Mathematics 151.

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

232. Physics: Sound, Heat and Light. 5 hours.
233. **Physics: Electricity and Magnetism.** 5 hours.
For engineers and physical science majors. (4 + 2). 231 should precede 232 and 233. Prerequisite: Calculus 153.

250. **Astronomy.** Celestial bodies; distance, motion, size, distribution of planets, stars, extragalactic nebulae, and modern theories regarding them. 3 hours.

303. **Modern Physics.** The concepts of relativity, quantum and wave mechanics, atomic structure and absorption and emission processes, Prerequisites: Calculus 252 and Physics 233. 3 hours.

310. **Theory and Advanced Laboratory: Mechanics.** 1-3 hours.

320. **Theory and Advanced Laboratory: Light, Heat, Sound.** 1-3 hours.

330. **Theory and Advanced Laboratory: Electricity.** 1-3 hours.

Credit is given in courses 310, 320, 330 and 340 according to the work done. Offered every quarter. Prerequisite: Physics one year.

351. **Analytical Mechanics I.** Vector analysis, kinematics, conservative forces, planetary motion, pendulum, free and forced oscillations, coupled systems and normal coordinates, angular momentum, rigid bodies. Prerequisites: Calculus and Physics 233. 3 hours.

352. **Analytical Mechanics II.** Lagrange equations, canonical formulation, principle of least action, normal coordinates, rigid bodies, special relativity, mathematical methods. Prerequisites: Mathematics 351-352 and Physics 351. 3 hours.

353. **Nuclear Physics.** For physics majors and engineers. Nuclear structure, nuclear processes and radiation theory. Prerequisite: Modern Physics 303. 3 hours.

361. **Electronics.** Electron ballistics, vacuum tubes, rectifiers, amplifiers, oscillators, modulators, electron tube instruments. Prerequisite: Physics 213 or 233. 3 hours.

363. **Geometrical Optics.** The laws of geometrical optics, image formation by mirrors and lenses, optical aberrations and optical instruments. Prerequisite: Physics 232. 2 hours.

411. **Electricity and Magnetism I.** Electrostatic field theory, capacitance, multipole expansion, dielectric properties of matter; magnetic field theory; electromagnetic induction; magnetic properties of matter; Maxwell’s equations and electromagnetic waves. Prerequisites: Mathematics 153 and Physics 233. 3 hours.

412. **Electricity and Magnetism II.** Advanced electric and magnetic fields, electric and magnetic properties of solids, electromagnetic radiation, Prerequisites: Mathematics 351-352 and Physics 411. 3 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: Physics 303. 3 hours.

433. **Theoretical Physics.** For students intending advanced work in physics, chemistry or mathematical physics. Selected topics in Classical Mechanics, Electromagnetic Theory, Quantum Theory, Relativity, Nuclear Theory, and Statistical Mechanics. 4 hours.

463. **Physical Optics.** The law of Physical Optics, interference, diffraction and polarization and instrumentation. Prerequisite: Physics 232. 3 hours.

490. **Special Topics in Physics.** 1-3 hours.

494. **Seminar in Physics.** 1-3 hours.

497. **Independent Study in Physics.** 1-3 hours.

**Psychology and Sociology**

(Department 133)

Professor Markle; Associate Professor Crider (Chairman); Assistant Professors Cohoe, Gates, Zauderer; Instructors Adams, Compton; Lecturers K. Crider, N. DaPore.

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; give them deeper insight into the requirements of intelligent citizenship and of useful participation in community life; and prepare them for graduate work in their respective fields.

In order to complete a major in psychology, the student must complete forty-five hours in psychology. The following courses are required: Psychology 100, 210, 350, 431; Biology 100, 112, 113, 231, and 430.

In order to complete a major in sociology, the student must complete forty-five hours in sociology. The following courses are required: Sociology 105, 205, 206, 305, 306, 307, 403, 414, 417, 418, 419; Psychology 350 and 351.

To complete a major in sociology with a concentration in social welfare, the student must complete the following courses: Biology 100, 112, 113; Political Science 105; Psychology 100 and 351; Sociology 105, 204, 205, 206, 305, 306, 321 or 403, and the seven courses in the Social Welfare sequence—341, 342, 343, 441, 442, 443, and 444.

**Psychology**

100. **Psychology.** General research and concepts in human behavior. Lectures, demonstrations, observations and experimentation. One unit.
210. **Advanced General Psychology.** Scientific study of behavior with an in depth emphasis on methodology and implications of contemporary theories. Prerequisite: Psychology 100. 3 hours.

215. **Developmental Psychology.** Basic theories in human development from conception to old age; contemporary research at each age level. Prerequisite: Psychology 100. 3 hours.

311. **Psychology of Personality.** The major theories of personality from Freud to contemporary theoretical approaches. Prerequisite: Psychology 100. 3 hours.

312. **Psychology of Personality.** Readings from original sources of the major personality theorists; analysis of personality tests and measurement techniques. Prerequisite: Psychology 311. 3 hours.

333. **Psychology of Learning.** The theoretical frames of reference and supporting research which underly current conceptualizations of behavior modification in terms of the process of learning; conditioning and reinforcement theories. Prerequisite: Psychology 100. 3 hours.

350. **Social Statistics.** The methods and uses of descriptive and inferential statistics in the Social Sciences; measures of central tendency, variance and differential analysis. Prerequisites: Mathematics 100; Psychology 100 or Sociology 105. 3 hours.

351. **Social Psychology.** The effect of social and cultural forces upon the individual. The nature and development of attitudes, language, cognitive processes, etc. Individual and group projects illustrative of the methodology of Social Psychology. Prerequisite: Psychology 100. 4 hours.

353. **Psychology of Business and Industry.** Psychology as used in business, industry and personnel work. Prerequisite: Psychology 100. 3 hours.

411. **Counseling Psychology.** The basic psychological principles involved in the counseling situation; techniques of interviewing and test evaluation. Prerequisite: Psychology 100. 3 hours.

420. **Abnormal Psychology.** The history of mental illness; psychological, sociological and biological factors in the development of mental illness; diagnostic procedures. Prerequisite: Psychology 100. 3 hours.

421. **Abnormal Psychology.** Types of mental illness and their treatment; principles of psychological adjustment, normal and abnormal. Prerequisite: Psychology 420. 3 hours.

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 100. 3 hours.

431. **Introduction to Experimental Psychology.** Methods of experimental psychology; report writing, terminology, and relevant background materials. Prerequisite: Psychology 100 and 350. 4 hours.

434. **Historical Study of Psychology.** Lines of thought influencing the field of psychology; Greek and European antecedents of major issues up to the 20th century. Prerequisite: Psychology 210. 3 hours.
435. Systems of Psychology. Early systems of psychological thought and theoretical views of the 20th century. Prerequisite: Psychology 434. 3 hours.

436. Readings in Psychological Research. Current research and theory in psychological literature. Course may be repeated once. Prerequisite: permission of instructor. 3 hours.

437. Practicum in Psychology. Work with patients in a clinical setting under supervision; practical experience in interviewing and administering routine psychology tests. May be repeated. Prerequisite: permission of instructor. 3 hours.

490. Special Topics in Psychology. 1-3 hours.

494. Seminar in Psychology. 1-3 hours.

497. Independent Study in Psychology. 1-3 hours.

Sociology

105. Sociology. Basic sociological concepts most needed for understanding and analyzing modern social structure and the process of social change. One unit.

204. Marriage and the Family. An institutional perspective on the family; patterns of courting, marital and parental behavior; trends in the contemporary American family as defined by current research. Prerequisite: Sociology 105 or Psychology 100. 3 hours.

205. Social Organization. Concepts of sociology and their uses; sources of continuity and change in human societies. Prerequisite: Sociology 105. 3 hours.

206. American Society (continuation of 205). Sociological analysis of contemporary American society; the structure of American social life, the major institutions of American society, and the sources of social change in American society. Prerequisite: Sociology 205. 3 hours.

305. Social Deviance. Sociological perspectives on the processes of individual and group deviance: a discussion of selected major problems of deviance in industrial societies, their social causes, consequences, and solutions. Prerequisite: Sociology 206. 3 hours.

306. Social Disorganization (continuation of 305). A structural analysis of the problems of complex societies; the systemic strains and inconsistencies which generate societal problems, such as poverty; and the social consequences of mass society. Prerequisite: Sociology 305. 3 hours.

307. Demography. Size, composition, distribution and growth of human populations; theories of population growth and migration; problems in social policy in overpopulation and economic development. Prerequisite: Sociology 206. 3 hours.

315. Physical Anthropology (Introductory). Basic concepts of physical anthropology; brief review of development of physical anthropology, relation to other branches of anthropology and other sciences; origins of life; taxonomy; primate evolution. Should be followed by Sociology 316. 3 hours.
316. Physical Anthropology (continuation of Sociology 315). Population genetics; race; human evolution; the future evolution of man. Prerequisite: Sociology 315. 3 hours.

317. Archaeology. The nature and functions of archaeological science; archaeological history, research techniques, and interpretation; summary of world archaeology, with emphasis on North and Central America; brief introduction to Ohio archaeology. 3 hours.

321. Criminology. The development of the various theories of criminal behavior; important research contributions to the sociological understanding of crime and criminals; sociological approaches to law and to judicial and penal organizations. Prerequisite: Sociology 105 or Psychology 100. 3 hours.

330. Cultural Anthropology (Introductory). An introduction to basic concepts; brief review of history of anthropology and its changing influence; future; applications of anthropological knowledge. 3 hours.

331. Cultural Anthropology (Analysis of Culture). Kinship and political structures, economics, language and linguistics, education and technology, religion and ritual, the arts, etc. Prerequisite: Sociology 330. Students taking Sociology 331 are urged to follow with 332. 3 hours.

332. Cultural Anthropology (Cultural Change). Processes of acculturation, diffusion, invention, etc.; relationships of elements of social structure to rates and types of changes, resistance to change, etc. Prerequisite: Sociology 330; Sociology 331 strongly recommended. 3 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. Basic processes used in social work practices; social case work, social group work, and intergroup or community work. Prerequisite: Sociology 341, 342. 3 hours.

403. Minority Groups. The phenomena which arise when groups of people who differ racially or culturally come into contact with one another. Prerequisite: Sociology 105. 3 hours.

404. Sociology of Knowledge. The social context of idea systems; the contribution of sociologists from Marx to the present; the deviations and functions of conservative and utopian ideologies; the relations between ideas and social change. Prerequisite: Sociology 105 or Psychology 100. Offered in 1969-70. 3 hours.

405. Sociology of Religion. The major contributions of social scientists to the study of religious institutions; the various forms and social functions of religion, the structure of religious behavior and organization; the relations between religion and other social institutions. Prerequisite: Sociology 105 or Psychology 100. 3 hours.
414. **Urban Sociology.** A comparative study of the organization, social processes, problems, and interrelationships of rural and urban communities. Prerequisite: Sociology 105. 3 hours.

415. **Mass Communication.** The social structure of mass communications and their audiences; the social consequences of the media employed; content analysis; the effects of mass communications on its audience. Prerequisite: Sociology 105 or Psychology 100. Offered 1970-71. 3 hours.

416. **Collective Behavior.** Theory and research in the sociological study of crowds, public, social movements and revolutions; the study of the origins, development and structure of uninstitutionalized social behavior and of social attempts to accomplish social change. Prerequisite: Sociology 105 or Psychology 100. Offered in 1969-70. 3 hours.

417. **Theory Construction.** The nature and functions of theory in the sciences; the major types of social theories; the relationships between theories and facts; the construction and uses of theories in social science; the social effects of social theories. Open to senior sociology majors only. Prerequisite: Sociology 206. 3 hours.

418. **History of Social Theory.** The development of sociological theory from Comte to the present, with emphasis upon 20th century American theory representing changing research interests and goals. Open to senior sociology majors only. Prerequisites: Sociology 206, 417 and Psychology 350. 3 hours.

419. **Methods in Social Research.** Review of major methodological techniques in sociological research, illustrated by analysis of important research monographs and journal articles; development of individual student research projects using appropriate best methods. Open to senior sociology majors only. Prerequisites: Sociology 206, 417, 418 and Psychology 350. 3 hours.

441-442. **Social Welfare Investigation.** Social welfare investigation and methods of research and their application to the analysis of social phenomena. Prerequisites: Sociology 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. Prerequisites: Sociology 441, 442. 5 hours.

444. **Domestic Law.** Legal topics relating to social welfare including laws of marriage, divorce and alimony, and laws pertaining to infant and child rights. Prerequisites: Sociology 441, 442. 3 hours.

491. **Special Topics in Sociology.** 1-3 hours.

495. **Seminar in Sociology.** 1-3 hours.

498. **Independent Study in Sociology.** 1-3 hours.
SPEECH AND THEATER
(DEPARTMENT 153)

ASSOCIATE PROFESSOR KERNS (Chairman); INSTRUCTORS LEE, WILD; ASSISTANT INSTRUCTOR RIGGLE; LECTURER FRONTERHOUSE.

SPEECH

The speech program is designed to provide the student with a basic knowledge of the art and skill of man communicating with man. Beginning courses offer instruction in the composition and delivery of well-organized, meaningful speeches. Advanced courses for majors deal with the theory, development and practice of the various disciplines.

For a major in Speech, the following courses are required: 110, 161, 254-255, 262, 270 (3-6 hours), 272, 273, 360, 363, 365, 371, 373, 494 (1-3 hours). Additional courses must be selected from the Speech and Theater Department to complete the minimum 45 hour requirement for the major. Speech 100 does not count toward the major.

100. Speech. Basic principles of oral communication with attention to individual needs. One unit.

110. Argumentation (Formerly 372). Argumentative speaking and debate; proposition analysis; use of evidence, elementary logic, and case construction. 3 hours.

161. Choral Speaking. The oral interpretation of poetry and prose by many voices speaking as one, and including solos and groupings of voices. Public performance will climax the course. 1 hour.

254-255. Voice and Diction I (Formerly 261) and II. Voice and speech production: intensive drill, on a phonetic basis, in articulating the sounds which make up the English language, with attention to the production of good vocal quality and expression. Prerequisite: Speech 100. 6 hours.

260. Speech Correction in the Schools. The recognition of speech disorders; speech and listening activities for the normal school child. 3 hours.

262. Oral Interpretation. The analysis and interpretation of the logic and emotional meaning in poetry, prose, and drama. Theories and practice in the art of oral interpretation. Prerequisites: Speech 254-255. 3 hours.

270. Speech Activities. Extra-curricular debate and/or individual speech activities. May be repeated for credit up to a maximum of six hours. 1 hour.

272. Advanced Public Speaking. More extensive application of basic principles of oral communication in the composition and delivery of original speeches. Prerequisite: Speech 100. 3 hours.

273. Seminar in the History of Public Address. Studies in the development of rhetorical theory and oratory, from the Greek period to the present. Prerequisite: Speech 272. 3 hours.

363. Advanced Oral Interpretation. Analysis and communication of significant forms of literature. Experimentation with various methods of oral interpretation, such as choral speaking, TV and radio scripts. Emphasis on advanced, individual work. Prerequisite: Speech 262. 3 hours.

365. Readers Theater. Individual and group performance in the interpretation of dramatic selections in the fields of the novel, short story, drama, and poetry. Public performance, as the climax of the course. Prerequisite: Speech 363. 1 hour.

371. Group Communication. The process of group discussion and problem-solving techniques. An opportunity to participate in and lead discussion. Prerequisite: Speech 100. 3 hours.

373. Persuasive Speaking. A description and evaluation of modern persuasive theory and techniques. Preparation and delivery of original speeches based on current problems of interest and importance. Prerequisite: Speech 110 or 272. 3 hours.

490. Special Topics in Speech. 1-3 hours.

494. Speech Seminar. Prerequisite: The student must have passed the English Proficiency Examination. 1-3 hours.

497. Independent Study in Speech. 1-3 hours.

THEATER

The program in Theater seeks to develop an understanding of the function of theater in our society, to foster an appreciation of the aesthetics involved, and to present theater experiences to the university as a whole. It also seeks to help to prepare future teachers for situations in which they may have to produce and/or direct plays. A basic program of courses is offered to all majors, with specialization possible in acting, directing, or technical work.

The theater major is required to participate, in some way, in all major theatrical productions during the year, and is required to take the following courses in Speech and Theater: 231, 232, 241-242, 254-255, 260 (3 hours), 281, 282, 283, 331, 386-387. Theater 105 does not count toward the major.

For the acting major, these additional courses are required: 262, 363, 495, 487, 488, 489.

The directing major is required to take these additional courses: 351-352, 441-442, 443, 495.

The technical major is required to take the following additional courses: 280 (3 additional hours), 439, 441-442, 443, 495.

A combined sequence in speech and theater, for those planning to teach, is also offered. Courses prescribed from both Speech and Theater sections of the department are: Speech 100, 110, 254-255, 260, 262, 270 (3 hours), 272, 363, Theater 105, 231, 232, 241-242, 280 (3 hours), 281, 282, 331, 351-352, 386-387. Speech 100 and Theater 105 do not count toward the major.
105. THEATER. A general survey of theater from ancient Greece through modern America with an understanding of theater arts—scene design, directing, lighting, costuming, acting. One unit.

231, 232. STAGECRAFT I AND II (Formerly 294, 295). Theoretical and practical work in the fundamentals of theater production. Prerequisite: Theater 105. 6 hours.

241-242. THEATER HISTORY I AND II (Formerly 292-293). The story of theater from the beginnings to the 18th century; and theater from the 18th century to the present. Prerequisite: Theater 105. 6 hours.

280. THEATER ACTIVITIES. Participation in some aspect of a theatrical production, or shop work in theater house. A maximum of six quarters may be taken for credit. 1 hour.

281, 282, 283. ACTING TECHNIQUE I, II, AND III. Exercises and improvisational work designed to develop the basic technical skills which are necessary for the actor in the theater. 9 hours.

331. MAKEUP (Formerly 491). Practice in the creation of basic straight makeup, and of character makeup, for the stage. 2 hours.

351-352. CHILDREN'S THEATER I AND II (Formerly 385-396). Methods of producing and directing plays for young people, with an understanding of the place of children's theater in modern society. Actual participation in the creation of theater for young people (writing, acting, directing, after a first quarter of methods). 6 hours.

386-387. DIRECTING I AND II. Methods of directing—theory and practice. During the second quarter, the student will produce a long scene from a 3-act play or a complete one-act. Prerequisites: One quarter of Acting Techniques and 231/232. 6 hours. (Alternate years—Offered 1969-1970.)

439. SCENE DRAFTING. Drawing of scaled ground plans, elevations, perspective sketches, and working drawings for the stage. 2 hours.

441-442. TECHNICAL THEATER. Instruction and practice in the arts of Scene Design (441), and Lighting Design (442). Prerequisites: 231, 232, 439. 6 hours. (Alternate years—Offered 1970-1971.)

443. TECHNICAL THEATER. Instruction and practice in the art of Costume Design. Prerequisites: 231, 232. 3 hours. (Alternate years—Offered 1970-1971.)

487, 488, 489. SCENE STUDY. Active participation in scenes rehearsed and presented for criticism in class. Scenes are studied from the modern as well as from the classic theater. Prerequisites: 281, 282, and 283. 9 hours.

491. SPECIAL TOPICS IN THEATER. 1-3 hours.

495. SEMINAR IN THEATER. 1-3 hours.

498. INDEPENDENT STUDY IN THEATER. 1-3 hours.
College of Engineering
College Of Engineering

LAWRENCE H. ARCHER, Dean.

ACADEMIC RECOGNITION

The Engineers' Council for Professional Development (ECPD), the only official accrediting agency for engineering curricula, has accredited all of the curricula 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 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 propose 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-eight years of its existence the College of Engineering has had more than twenty-eight 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 UNIVERSITY (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 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 entitled to honorable dismissal and eligible to return to the home institution 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 150 quarter hours or their equivalent. 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 satisfactory completion of their work a certificate is awarded indicating the course of study pursued and the amount of work covered.
ACADEMIC 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. Engineering students are responsible to fulfill the requirements of the current year's catalog as they apply to that year of his course.

STUDENT'S ACADEMIC STATUS

Good Standing is the status when no academic conditions exist, i.e., the accumulative average is at least 2.0.

Probation is noted the first time a student's accumulative average falls below 2.0 ("C" average). Normally, a student is given a full academic year to prove himself academically. Students may be carried on probation a second quarter if conditions and evidence indicate a possibility of improvement in academic attainment.

Consistent low academic attainment (below "C") subjects the student to SUSPENSION. Suspension implies the possibility of readmission at a later date, generally three quarters having elapsed.

Students in academic difficulty are required to meet with their adviser more frequently than those who progress satisfactorily.

CLASSIFICATION: Level and Rank

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. Second year students on the five-year program are RANK 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, or 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 course requirements, a minimum of 209 academic hours or the equivalent (unit courses equated at four hours each) is required for graduation. The student must have a scholarship rating of at least two quality point 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 one time, the Arts-Engineering program excepted.

All degree candidates must spend their last year in residence, taking at least forty-five quarter hours of fifth 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, 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 design rooms, classrooms, and laboratories, including Testing Materials Laboratory, Fluid Mechanics Laboratory, Concrete Laboratory, Soils Laboratory, Steam Laboratory, Thermodynamics Laboratory, Instrumentation Laboratory, Surveying Supply, Senior Design Room, Machine Shop, Power Laboratory, Electronics Laboratory, Control Laboratory, Analog Computer Laboratory, and Computer Center. A new Engineering College building on the new campus is scheduled for completion in 1971.
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 their use. The establishment of the Computer Center started 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 first year engineering students. Each 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 1620 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.

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 will help to create a much broader image of the engineer in this age.
### ARTS-ENGINEERING PROGRAM

#### FIRST YEAR

<table>
<thead>
<tr>
<th><em>English</em></th>
<th>112100 - 112101 - 112102</th>
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<th>112100 - 112101 - 112102</th>
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#### SECOND YEAR

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#### Notation:

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.

* Course sequences which must be completed in order to advance to the next rank classification.

** See definition of Unit Course, Liberal Arts College section.
ARTS-ENGINEERING PROGRAM (CONTINUED)

THIRD YEAR
THIRD LEVEL (Rank 63)

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FOURTH YEAR
FOURTH LEVEL (Rank 64)

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FIFTH YEAR
FIFTH LEVEL (Rank 65)

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</table>

* Course sequences which must be completed in order to advance to the next rank classification.
BASIC ENGINEERING

Professor Glass; Assistant Professor Busch, *Et al.*

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, i.e., through level three.

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

BASIC ENGINEERING: DESCRIPTIONS

(Department 201)

100. Pre-Engineering Mathematics Refresher. 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.


111. Introduction to Design (0 + 4)*. Introduction to design with particular emphasis on visualization and synthesis leading to engineering design and motivation of creativity, including orthographic, axonometric, and third angle projection, as well as elementary work projects and factory visitation. 2 hours.

112. Graphical Analysis (0 + 4). Elements of descriptive geometry leading to a facility in three dimensional vector analysis. Conversion of field data to functions using linearization and least squares procedures. Problem solutions utilizing graphical differential and integral calculus. 2 hours.

* (2 + 1) indicates the student contact hours per week. The first number gives the lecture hours while the second, shows the laboratory hours.
### FIRST YEAR

**SECOND LEVEL (Rank 24)**

<table>
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<th>Course</th>
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### SECOND YEAR

**THIRD LEVEL (Rank 34)**

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<tr>
<th>Course</th>
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<tr>
<td>Speech, <em>Thermo. 1 or C.E. Surveying</em></td>
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<td></td>
<td>15 2 16</td>
<td>11 3 12</td>
<td>16 6 18</td>
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**Notation:**

- 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.
- * Course sequences which must be completed in order to advance to the next rank classification.
- ** See definition of Unit Course, Liberal Arts College section.
### BASIC FIVE YEAR ENGINEERING PROGRAM

#### SECOND YEAR

**SECOND LEVEL (Rank 25)**

| *Philo., Rel., S-H Elective | 115100, 115105, | R | L | C | Unit |
| *Mathematics               | 123251 - 123252 - 123351 | 5 | 0 | 5 | Unit |
| *Physics 1, 2, 3           | 124231 - 124232 - 124233 | 4 | 2 | 5 | Unit |
| Speech, *Digital Computer 1, 2 | 153100, 201101 - 201102 | 2 | 1 | 2 | 2 Units |

**Total Units:** 9 2 10

+ 2 Units

| Winter | 11 | 3 | 12 |
| Spring | 13 | 3 | 15 |

#### THIRD YEAR

**THIRD LEVEL (Rank 35)**

| *Math-Science Elective |  |  |  |
|  |  |  |  |
| *Engineering Mechanics 1, 2, 3 | 201311 - 201312 - 201313 | 3 | 0 | 3 |
| *Passive & Active Circuits 1, 2, 3 | 201321 - 201322 - 201323 | 3 | 0 | 3 |
| *Circuits Lab 1, 2 | 201332 - 201333 | 0 | 3 | 1 |
| *Thermodynamics 1, (C.E. Surveying) | 201343 |  |  |
| Humanities or Soc. Sc. Elective | - | - | - |

| Fall | 14 | 0 | 14 |
| Winter | 14 | 3 | 15 |
| Spring | 16 | 3 | 17 |

*Course sequences which must be completed in order to advance to the next rank classification.

All footnotes on preceding page apply to this page as explanation.
120. **Orientation of Engineering Students** (1 + 0). 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. Designed to help the student to make the transition to college, as well as, properly orient the student in the profession. 1 hour.

311. **Engineering Mechanics 1** (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, and moments of inertia. Prerequisite: Math 153, Physics 231. 3 hours.

312. **Engineering Mechanics 2** (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: 311. 3 hours.

313. **Engineering Mechanics 3** (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: 312. 3 hours.

321. **Passive and Active Circuits 1** (3 + 0). Introductory concepts in circuit analysis. Solution of resistive circuits using Ohm’s and Kirchoff’s Laws, mesh and nodal analysis, and network theorems. Prerequisite: Physics 233, 153. 3 hours.

322. **Passive and Active Circuits 2** (3 + 0). Analysis of circuits in the sinusoidal steady-state. Phasor solution, effective values of current and voltage, instantaneous and average power, series and parallel resonance. Prerequisite: 321. 3 hours.

323. **Passive and Active Circuits 3** (3 + 0). Magnetically coupled circuits, introduction to network topology, polyphase circuits and Fourier analysis. Prerequisite: 322. 3 hours.

332-333. **Circuits Laboratory 1 and 2** (0 + 3). A laboratory study of electric circuits. Prerequisite: 322 concurrently. 2 hours.


421. **Thermodynamics 2** (3 + 0). Relations among thermodynamic properties, mixtures, chemical reactions and equilibrium. Prerequisite: 343. 3 hours. Prerequisite: 201422. 3 hours.

Engineering properties of fluids, fluid statics, fluid dynamics, fluid resistance, boundary layer theory, steady flow in closed circuits and the introduction to flow through porous media. Prerequisite: 312. 3 hours.
FOUR YEAR PROGRAM—CIVIL ENGINEERING
(See Preceding Pages for First and Second Year and Notation)

### THIRD YEAR

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<td>202431 - 202432 - 202443</td>
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### FOURTH YEAR

**FOURTH YEAR (Rank 44)**

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**FIFTH LEVEL (Rank 54)**

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</table>

* Course sequences which must be completed in order to advance to the next rank classification.
** The fourth and fifth levels for five-year program are identical to the above except the indicated courses will have already been completed. Corresponding ranks are 45 and 55, respectively.
Elective 1: M.E. Laboratory 1 or Thermodynamics 2; Elective 2: Thermodynamics 1 or Similitude.
† Courses for which substitutes may be allowed.
CIVIL ENGINEERING DEPARTMENT

PROFESSORS KEYSER; ASSOCIATE PROFESSORS ANDERSON, KOEHN, MILKS (Chairman).

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 as a consultant in engineering.

Department facilities include high grade instruments and appliances in well-equipped laboratories. Laboratory work is offered in testing materials, concrete, soil mechanics and fluid mechanics, as well as field work in surveying.

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: DESCRIPTIONS

(Department 202)

Civil Engineering courses use laboratory facilities as needed. The number of recitations and laboratory hours per week is an approximate average over the quarter and will vary with immediate class content.

303. Surveying (3 + 3). Use of various tapes, level and transit, differential and profile leveling, traversing, theory and practice with horizontal and vertical curves, fundamentals of aerial photography. Prerequisite: Departmental permission. 4 hours.

401. Mechanics of Materials (3 + 0). Deflection, combined loadings, repeated loading, dynamic loading, connections, formulation of statically indeterminate problems. Prerequisite: 201313. 3 hours.
411. **STRUCTURAL ANALYSIS 1 (4 + 0)**. Principles of numerical analysis used in solving structural problems; numerical methods, linear programming, finite element, finite difference, and applications. Prerequisite: Math 341-51. 4 hours.

412. **STRUCTURAL ANALYSIS 2 (4 + 0)**. Fundamentals of statically determinate structures; deflections, displacements, use of models to illustrate structural behavior, principle of superposition and study of elastic curve. Prerequisite: 411. 4 hours.

413. **STRUCTURAL ANALYSIS 3 (4 + 0)**. Fundamentals of statically indeterminate structures; classical and approximate methods of solution. Prerequisite: 412. 4 hours.

423. **HYDRAULICS (3 + 0)**. Hydraulic analysis of piping systems using the digital computer. Steady flow in open channels non-uniform flow in open channels, elements of Hydrology, introduction to chemical quality control of surface and subsurface waters. Prerequisites: 201422. 3 hours.

431. **TRANSPORTATION (3 + 3)**. Principles of transportation systems; economics, finance, and planning; and design, construction, and maintenance. Prerequisite: Permission of instructor. 4 hours.

432. **URBAN PLANNING (3 + 3)**. Principles of city and regional planning; land use, zoning, housing codes, subdivision regulations, metropolitan problems, and urban development. Prerequisite: 431. 4 hours.

452. **MATERIALS SCIENCE (3 + 0)**. Fundamentals of physical and chemical properties of engineering materials. Prerequisite: Chemistry 112, Physics 233. 3 hours.

453. **GEOLOGY (3 + 3)**. Principles of physical geology. Physical and chemical properties of minerals and rocks, geologic processes, earth materials, processes of erosion and deposition, crustal deformations, ground water hydrology. Prerequisite: Chemistry 112, 4 hours.

463. **SIMILITUDE (3 + 0)**. Types of similitude, dimensional analysis, and theory of models. Prerequisite: 201313, 422. 3 hours.

491-492-493. **INDEPENDENT STUDY**. The independent planning of an engineering design project by individual study of a topic of particular interest to the student. Prerequisite: Fourth level and Departmental permission. 1-3 hours.

511. **SANITARY ENGINEERING 1 (3 + 0)**. Development of sources of water supply; determination of quantity of storm water; design of water distribution systems, storm water sewers, and sanitary sewers; hydraulic design of water and sewage treatment plants. Prerequisite: Chemistry 112, 423. 3 hours.

513. **SANITARY ENGINEERING 2 (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: 511. 3 hours.

521. **REINFORCED CONCRETE 1 (3 + 0)**. 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 413, 452. 3 hours.
522. **Reinforced Concrete** 2 (4 + 0). Retaining walls, footings, slabs, and thin shell roofs. Fundamentals of prestressing. Prerequisite: 521. 4 hours.

523. **Structural Systems Design** (3 + 0). Design of structural systems emphasizing optimization, creativity, and decision making. Prerequisites: 522, 542. 3 hours.

531. **Soils** 1 (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: 423, 453. 4 hours.

532. **Soils** 2 (3 + 3). Analysis of stress conditions imposed on the supporting soils by foundations. Design of foundations, retaining structures, and piles. Prerequisite: 531. 4 hours.

533. **Construction Methods** (3 + 0). Specifications, economical construction methods, estimating critical path, engineering economics as applied to various engineering projects. Prerequisite: Departmental permission. 3 hours. (Formerly 513).

541. **Structural Design** 1 (4 + 0). 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: 413. 4 hours.

542. **Structural Design** 2 (3 + 0). Theory of plastic design; analysis of ultimate load, design of connections, determination of deflections using plastic design, and comparison to elastic design. Prerequisite: 541. 3 hours.

543. **Advanced Structural Mechanics** (3 + 0). Theory of elasticity, structural stability, plates and shells, and vibrations. Prerequisite: 542. 3 hours.

522. **Engineering Law** (3 + 0). Legal principles of vital interest to engineering Professional liability. General nature of the law and the working of the judicial system. Prerequisite: Departmental permission. 3 hours. (Formerly 533).

590. **Civil Engineering Project; or, Special Problems; or, Advanced Transportation Engineering; or, Advanced Sanitary Engineering; or, Hydrology and Hydraulic Engineering** (3 + 0). Practical projects involving calculation, design, and engineering judgment. Prerequisite: Fifth Level; OR, special problems, Prerequisite: Last Quarter of Fifth Level; OR, topics in highway, railroad, water, and air transportation, Prerequisite: 431, 532; 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: 511, 512; 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: 423. 3 hours.

591-592-593. **Independent Study**. The independent planning of an engineering design project or the individual study of a topic of particular interest to the student. Prerequisite: Departmental permission. 1-3 hours.
ELECTRICAL ENGINEERING DEPARTMENT

PROFESSORS KLINGENBERGER (Chairman), CARMEAN; ASSOCIATE PROFESSOR STAHL; ASSISTANT PROFESSORS JOHANSEN, GUENTZLER.

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.

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 COURSE DESCRIPTIONS

(Department 203)

401. Engineering Analysis (3 + 3). Professional methods of solving engineering problems; instruction in the use and practicability of numerical method solutions. Prerequisite: Math 341-351. 4 hours.

411. Electronics 2 (3 + 0). Electrons and holes in semiconductors. Prerequisite: 201323. 3 hours.

412. Electronics 2 (3 + 0). Operating principles of electronic devices, models representing these devices, and their use in simple circuitry. Prerequisite: 411. 3 hours.

413. Electronics 3 (3 + 0). Large and small signal amplifiers, frequency response of amplifiers, and oscillators. Prerequisite: 412. 3 hours.

431-432. Fields and Waves 1 and 2 (4 + 1). Electrical phenomena from the viewpoint of field theory. Vector analysis used throughout. Prerequisite: 201323, Math 341-351. 8 hours.

433. Fields and Waves 3 (4 + 0). Vector potential functions; energy propagation; microwave generators, amplifiers, and detectors; basic microwave antennas and radiation characteristics; microwave circuit design; introduction to masers. Prerequisite: 432. 4 hours.
### THIRD YEAR

#### FOURTH LEVEL (Rank 44)

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#### FOURTH YEAR

#### FIFTH LEVEL (Rank 54)

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### Notes

* Course sequences which must be completed in order to advance to the next rank classification.
** The fourth and fifth levels for five-year program are identical to the above except the indicated courses will have already been completed. Corresponding ranks are 45 and 55, respectively.
442. **Transient Analysis** (4 + 0.) Application of Laplace Transform methods to transient phenomena in linear electrical and mechanical systems. Prerequisite: 201323, Math 353. 4 hours.

443. **Control Systems 1** (3 + 0). Closed-loop systems performance from equations and transfer-function plots. Prerequisite: 442. 3 hours.

451. **Electrical Engineering Laboratory 1** (0 + 3). Instrumentation and measurement circuits and techniques. Prerequisite: 201323. 1 hour.

452-453. **Electrical Engineering Laboratory 2 and 3** (0 + 3). Study of active devices and their associated circuits. Prerequisite: 412 concurrently. 2 hours.

463. **Analog Computer Laboratory** (0 + 3). Introduction to analog computer programming. Prerequisite: 442. 1 hour.

511. **Electronics 4** (3+ 0). Wave generation and shaping. The study of timing, switching, logic, and memory circuits. Prerequisite: 411, 442. 3 hours.

512. **Electronics 5** (3 + 0). Electronics power conversion circuits and devices. Power control and regulator circuits; power supply filters. Prerequisite: 511. 3 hours.

521. **Circuit Synthesis** (3+ 0). Introduction to the principles of modern circuit synthesis. Prerequisite: 442. 3 hours.

522. **Nonlinear Analysis** (3 + 0). Analysis of physical systems containing nonlinear elements. Analytical, graphical, and numerical methods are studied. Prerequisite: 541. 3 hours.

523. **Communication Theory** (3 + 0). An introduction to the principles of communication theory. Prerequisite: 412, 442. 3 hours.

531. **Energy Conversion 1** (3 + 0). The underlying principles of electromechanical energy conversion are studied. Concept of rotating magnetic fields. Theory of transformers, direct-current machine, synchronous machines and induction machines. Prerequisite: 442. 3 hours.

532. **Energy Conversion 2** (3 + 0). Steady state and transient analysis of transformers, direct-current machines, synchronous machines and induction machines. Prerequisite: 531. 3 hours.

533. **Energy Conversion 3** (3 + 0). An introduction to non-electro-mechanical energy converters, thermoelectricity; thermionic converters; MHD engines; photovoltaic effect, and solar cells. Prerequisite: 451, Physics 303. 3 hours.

541. **Control Systems 2** (3 + 0). Control system design using root locus and frequency response methods. Prerequisite: 443. 3 hours.

551. **Electrical Engineering Laboratory 4** (0 + 3). Continuation of 453 and electronic wave shaping and switching circuits. Prerequisite: 453, 511 concurrently. 1 hour.

552. **Electrical Engineering Laboratory 6** (0 + 3). Continuation of 551 and power electronics application. Prerequisite: 551, 512 concurrently. 1 hour.
553. **Electrical Engineering Laboratory 8 (0 + 3).** Laboratory study of non-linear systems utilizing analog and digital computer techniques. Prerequisite: 522 concurrently. 1 hour.

561. **Electrical Engineering Laboratory 5 (0 + 3).** Laboratory study of automatic control systems. Prerequisite: 453, 463, 541 concurrently. 1 hour.

562. **Electrical Engineering Laboratory 7 (0 + 3).** Study of the generalized machine and other DC, synchronous, and induction machines. Prerequisite: 531, 532 concurrently. 1 hour.

563. **Electrical Engineering Laboratory 9 (0 + 3).** Continuation of 562 and a laboratory study of non-electromechanical energy conversion devices. Prerequisite: 533 concurrently. 1 hour.

590. **Projects.** Independent planning and conduct of an engineering design or development project in electrical engineering. Prerequisite: Departmental permission. 1-3 hours.

591. **Independent Study.** Individual study of a topic of particular interest to the student in electrical engineering. Prerequisite: Departmental permission. 1-3 hours.

592. **Current Topics.** Group study of selected topics of current interest in electrical engineering. Prerequisite: Departmental permission. 1-3 hours.

593. **Seminar.** A series of discussions with practicing engineer pertaining to design problems under their direction in electrical engineering. Prerequisite: Departmental permission. 1-3 hours.

**MECHANICAL ENGINEERING DEPARTMENT**

**Professors Burton (Chairman), Horldt; Associate Professor Scroggin; Assistant Professors Farrington, Whisler (On Leave); Instructor Lavan.**

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.
FOUR YEAR PROGRAM—MECHANICAL ENGINEERING  
(See Preceding Pages for First and Second Year and Notation)

THIRD YEAR

FOURTH LEVEL (Rank 44)

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**Fifth Level (Rank 54)

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FOURTH YEAR

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| Total Unites | 15 9 18 | 15 9 18 | 15 3 16 |

* Course sequences which must be completed in order to advance to the next rank classification.

** The fourth and fifth level for five-year program are identical to the above except the indicated courses will have already been completed. Corresponding ranks are 45 and 55, respectively.

MECHANICAL ENGINEERING COURSE DESCRIPTIONS

(DEPARTMENT 204)


412. MATERIALS 2 (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; including their programming for numerical and tape control for automation and mass production. Prerequisite: 411. 2 hours.

413. MECHANICAL DESIGN 1 (2 + 3). Sequence of design of machine elements: analytical study of conventional components and units, their sizing and shaping, then calculation as well as proportions and ratios. Preparation and execution of sketches and drawings according to professional standards. Prerequisite: 412. 3 hours.

423. GAS DYNAMICS (3 + 0). Isentropic (including nozzles and diffusers), diabatic, and frictional flow cases. Shock phenomena and generalized one-dimensional flow. Prerequisite: 201422. 3 hours.

431-432. MECHANICAL ENGINEERING LABORATORY 1 and 2 (2 + 3). Systematic study of experimentation as a comprehensive process; subjects covered in recitations are applied in laboratory exercises. Theory of measurements, measurement systems, experimentation planning methods, systematic analysis of results, and effective report writing. Prerequisite: Fourth level. 4 hours.

435. MECHANICAL ENGINEERING LABORATORY 3 (0 + 6). Small groups (3 or 4 students) investigate various physical phenomenon using methods studied in previous laboratory courses. To develop self-reliance in defining and solving new problems by means of instrumentation and measurement devices. Comprehensive reports present findings from tests performed. Prerequisite: 432. 2 hours.

441. KINEMATICS (3 + 3). Mechanisms and their motion: acceleration, velocity, and displacement of machine elements (gears, cams, etc). Prerequisite: 201312. 4 hours.

442. ADVANCED THERMODYNAMICS (3 + 0). Study in depth of the more important power and refrigeration devices and systems. Introduction to special non-equilibrium topics. Prerequisite: 201421. 3 hours.

443. HEAT TRANSFER 1 (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: 201422. 3 hours.

452. CONTROL SYSTEMS 1 (3 + 3). Modelling, analysis and design of linear feedback control systems. LaPlace transforms, transfer functions, frequency response and root locus techniques. Laboratory work in analog simulation of dynamic systems and performance studies of real systems. Prerequisite: 201323. 4 hours.
453. **Control Systems 2 (3 + 0).** Time domain analysis and design of control systems using state variable formulation. Digital control techniques and selected nonlinear system studies. Prerequisite: 452. 3 hours.

502. **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: 511. 3 hours.

511. **Mechanical Design 2 (3 + 3).** Execution of complete designs of machines or units applying previously studied components and mechanisms, in order to develop engineering judgment and professional proficiency from the original conception of an idea to the finished product. Prerequisite: 413. 4 hours.

512-513. **Engineering Systems Design 1 and 2 (3 + 3).** Topics related to design of engineering systems studied in depth with emphasis on the interaction of machine elements. The student is required to design a system which reflects his previous training in many areas. Engineering judgment, creativity and inventiveness are encouraged, as the design process is considered from inception of an idea to the completed design. Prerequisite: Fifth level. 8 hours.

521. **Thermal Systems Analysis (3 + 0).** Comprehensive analysis of engineering systems. Emphasis on analytical thinking in developing solutions to new problems. Thermal systems are emphasized. Prerequisites: 442, 443. 3 hours.

522. **Engineering Analysis 1 (3 + 0).** Application of advanced engineering mathematics to the analysis of physical systems. Open to all engineering students regardless of major. Prerequisite: Department permission. 3 hours.

523. **Engineering Analysis 2 (3 + 0).** Application of operations research methods to optimization of engineering systems. Linear programming is emphasized. Open to all engineering students regardless of major. Prerequisite: Departmental permission. 3 hours.

531-532-533. **Mechanical Engineering Laboratory 4, 5, and 6 (0 + 6).** Individual and group projects with particular emphasis on planning and report writing. Upon approval of the Mechanical Engineering faculty a student may undertake a two quarter in depth, experimental study, with a specific faculty member as project advisor. Prerequisite: 433. 6 hours.

541. **Heat Transfer 2 (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: 443. 3 hours.

542-543. **Advanced Dynamics 1 and 2 (3 + 0).** Fundamentals of linear and nonlinear vibration of single degree of freedom, multi-degree of freedom, and continuous systems. Lagrangian dynamics and other selected topics in advanced dynamics. Prerequisite: 201312. 6 hours.

590. **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: Fifth level. 1-5 hours.
College Of Pharmacy

DR. LEROY D. BELTZ, Dean.

The Ohio Northern University College of Pharmacy endeavors today, as in the past, to meet the high standards of education demanded by the profession of pharmacy. Currently, the College of Pharmacy occupies a modern, one and one-half million dollar building, designed and equipped to provide the facilities required for contemporary pharmaceutical education. The course of instruction in pharmacy now is a five-year program leading to the Bachelor of Science in Pharmacy (B.S. Pharm.) degree.

Throughout its eighty-four year history, the Ohio Northern University College of Pharmacy has played an important role in pharmaceutical education. Over eighteen hundred pharmacists have been graduated by this institution. Its position in pharmaceutical education in Ohio is particularly significant. More than one-third of the registered pharmacists practicing in Ohio are graduates of the Ohio Northern University College of Pharmacy. Its graduates are particularly active and prominent in the local, state, and national pharmaceutical organizations.

The College of Pharmacy is an integral part of Ohio Northern 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 the Colleges of Pharmacy, and is accredited by the American Council on Pharmaceutical Education.

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 GRADUATION

Each candidate for a degree:
1. Must successfully complete an English Proficiency test.
2. Must be of good moral character.
3. Must have completed not less than 250 quarter hours (or its equivalent) of acceptable course work and 3 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 professional courses as defined by the American Council of Pharmaceutical Education.
5. Must meet such other qualifications as the faculty may determine.

LIBRARY

The facilities of the main library of the University are at the disposal of the pharmacy students. Many of the current books and classics contributing to an appreciation of the Liberal Arts and Sciences are to be found there along with books, periodicals, and journals pertaining to pharmacy, medicine, and related professions. Current issues of pharmaceutical journals are available in the reading rooms of the College of Pharmacy.
REQUIREMENTS FOR ADMISSION TO PRE-PROFESSIONAL EDUCATION

Students entering the pre-professional pharmacy program should have four years of English, three years of mathematics (algebra I and II and plane geometry), but priority will be given to students with additional credit; 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 the entrance requirements of the College of Liberal Arts.

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 College of Pharmacy proof of satisfactory completion of college courses totaling not less than 90 quarter hours or 60 semester hours (or its equivalent) 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 Pro-
gram must be completed before the student is permitted to enter the second year of the Professional Program.

STANDARDS OF SCHOLARSHIP

A student who fails to maintain the prescribed standards of scholarship will be subject to one of the following actions; namely: (1) being placed on probation, (2) being suspended from the College of Pharmacy, or (3) being dismissed from the College of Pharmacy.

If a student's accumulative quality point average falls below 2.0, the student will be placed on probation. If a student on probation does not restore his quality point average during the following or any subsequent quarter, he will be continued on probation and his participation in extra-curricular activities shall be reviewed by his adviser, the Dean of Students and the Dean of the College.

Any student with an unusually low quality point average for any quarter may be placed on probation.

Actions to suspend or dismiss a student from the College of Pharmacy shall be initiated by the Dean of the College of Pharmacy when just cause for such action is evident. Actions to suspend or dismiss a student must be approved by a majority of the faculty of the College of Pharmacy.

If action is taken to suspend a student, the suspension will be for a definite period of time and the student will be eligible automatically to resume his studies at the end of the suspension period. If the student, however, fails to resume his studies within one year of the end of his suspension period, he may be required to repeat certain courses for which he may already have received a passing mark or he may be required to pass a qualifying examination in such courses.

If action is taken to dismiss a student, it is to be regarded as a terminal action; therefore, the student is not eligible for readmission to the College of Pharmacy at any time thereafter.
# PROGRAM OF STUDY LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN PHARMACY

## PRE-PHARMACY

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<th>First Year (P-1)</th>
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<td>Biology 100</td>
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<tr>
<td>Pharmacy 101</td>
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<td>Physical Educ.</td>
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1. The mathematics sequence will be determined on the basis of achievement in high school and college entrance examinations, especially the mathematics achievement examination, Level I.

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<tr>
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<td>Physics 211</td>
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<tr>
<td>Chemistry 231</td>
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<tr>
<td>Economics 100</td>
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<td>First Aid 112</td>
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* Unit as defined in the section of the catalog by the College of Liberal Arts.

## PHARMACY

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<td>Physiology 331</td>
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<td>Biochemistry 341</td>
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<td>Inorganic Med.</td>
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<td>Chem. 351</td>
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<td><strong>Fall</strong></td>
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<tr>
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<tr>
<td>Pharmacognosy 421</td>
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Fifth Year (P-5)

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<td>Pharm. Marketing 553</td>
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In addition to the foregoing curriculum, the student must accumulate a sufficient number of elective hours to meet the prescribed requirements for graduation.

COURSE DESCRIPTIONS

For descriptions of the pre-professional courses turn to the listing of the courses offered in the College of Liberal Arts.

First number in parenthesis is lecture hours per week, second is laboratory hours per week.

Courses listed with an * are elective.

DEPARTMENT OF PHARMACY

(Department 301)

Professors Beltz, Lee; Associate Professors Fitzgerald, Theodore (Chairman); Assistant Professor Vottero; Instructor Hripko.

101, 102 and 103. Pharmacy Orientation (1 + 0). The profession of Pharmacy; its educational requirements, its correspondence to related health professions, its service to public health.

211. Introduction to Pharmacy (3 + 3). The chemical and physical theories which are considered basic to the science of pharmacy. The laboratory work will be, in so far as possible, related to the theoretical considerations. 4 hours.

311. Pharmaceutical Preparations (3 + 3). Official solutions, suspensions, and other liquid dosage forms; the chemistry and/or the physics involved in making these products, and the correct procedures to be used in manufacturing, packaging, and labeling. Prerequisite: 211. 4 hours.

312. Pharmaceutical Preparations (3 + 3). A continuation of course 311; the study of solid and semi-solid dosage forms, such as ointments, pastes, tablets, capsules and related products. Prerequisite: Pharmacy 311. 4 hours.

333. Physical Pharmacy (3 + 3). The properties and technology of pharmaceutical systems and the fundamentals underlying the formulation, compounding, and stabilization of medicinal products are stressed. The laboratory enables the students to correlate the principles and equations with experimental observations. Prerequisite: Pharmacy 312. 4 hours.
421. **Introduction to Institutional Pharmacy** (2 + 0). Professional services, concepts, standards of practice and roles of the pharmacist in contemporary hospitals and related institutions. 2 hours.

431. **History of Pharmacy** (3 + 0). The educational, organizational and professional growth and development of pharmacy in Western Europe and North America. 3 hours.

501, 502, 503. **Prescription Practice** (3 + 3). The procedures involved in filling a prescription includes extemporaneous techniques, with emphasis in areas of major importance: ophthalmic, otic and nasal solutions, dermatological preparations and special solutions. Family health records are maintained throughout the course with a view toward predicting drug interactions. The most commonly utilized prescription and non-prescription medications are discussed as therapeutic classes and as individual formulations. Prerequisite: Pharmacy 333. 12 hours.

510.* **Pharmacy Cosmetics** (2 + 3). Formulation, preparation, and packaging of well known classes of cosmetics. Library assignments and reports are required. Prerequisite: Consent of instructor. 3 hours.

511.* **Veterinary Pharmacy** (2 + 0). The various pathological conditions peculiar to animals, and the pharmaceuticals used in the treatment thereof. 2 hours.

530.* **Manufacturing Pharmacy** (1 + 6). The formulation and fabrication by mechanized methods of a variety of pharmaceutical dosage forms. Prerequisite: Consent of instructor. 3 hours.

540. **Pharmacy Seminar** (3 + 0). Related areas of Pharmacy are discussed by visiting lecturers. Ethics, Third Party Payments, Surgical Appliances, Prescription Accessories, The Use of Diagnostic Reagents, The Importance of Pharmaceutical Organizations have been discussed. 3 hours.

550.* **Pharmacy Problems** (0 + 3, 0 + 6, or 0 + 9). Principles of pharmacy research; the literature pertinent to a specific problem, designing and conducting experiments to solve the problem, analyzing the resultant data, and preparing a written report of the work. This course is offered in the fall, winter, and spring quarters. Prerequisites: Pharmacy 333 and consent of instructor. 1-3 hours.

570.* **Advanced Institutional Pharmacy** (2 + 0). A study of the organization and management of contemporary hospitals and the interrelationship of the pharmacy department to the hospital structure. Prerequisites: Pharmacy 421 and consent of instructor. 2 hours.

**DEPARTMENT OF PHARMACEUTICAL CHEMISTRY**

(Department 302)

Professor: Smith (Chairman) and Stuart.
341. Biochemistry (3 + 3). The chemistry of carbohydrates, fats, proteins, nucleic acids and enzymes and the metabolism of carbohydrates. Prerequisite: Chemistry 233. 4 hours.

342. Biochemistry (3 + 3). A continuation of Pharmaceutical Chemistry 321. Metabolism of fats, proteins and nucleic acids, the chemistry of blood, respiration, diuresis and diuretics, vitamins and hormones. Prerequisite: Pharmaceutical Chemistry 341. 4 hours.

351. Inorganic Medicinal Chemistry (3 + 0). Modern concepts and theories. Methods of preparation, chemical tests, medicinal properties and doses. Prerequisite: Chemistry 113 or its equivalent. 3 hours.

352. Pharmaceutical Analysis (2 + 6). Gravimetric and volumetric analysis of chemicals, pharmaceuticals and crude drugs. Laboratory exercises emphasize analytical procedures, chemical control methods and some qualitative tests. Prerequisites: Chemistry 251 and 231. 4 hours.

353. Introductory Instrumental Analysis (3 + 3). Instruments used in qualitative, quantitative and control analysis. Prerequisite: Pharmaceutical Chemistry 352. 4 hours.

461. Chemistry of Organic Medicinal Products (3 + 0). The structural relationships and chemical properties of medicinal products of natural and synthetic origin. Prerequisite: Biochemistry 342. 3 hours.


550.* Chemistry Problems (0 + 3, 0 + 6, or 0 + 9). Principles of Pharmaceutical Chemistry research; literature pertinent to a specific problem, designing and conducting experiments to solve the problem, analyzing the resultant data, and preparing a written report of the work. Offered in the fall, winter, and spring quarters. Prerequisite: Departmental approval. 1-3 hours.

DEPARTMENT OF PHARMACOLOGY

(DEPARTMENT 303)

Professor Moffitt (Chairman); Lecturer Sherrin.

133. Pharmacology (3 + 0). An introductory course, designed for students of nursing, on pharmacodynamics and pharmacotherapeutics. Spring quarter. Prerequisite: a fundamental knowledge of human physiology. 3 hours.

431. Pharmacology and Toxicology I (5 + 3). The principles of pharmacology and toxicology and the pharmacodynamics, pharmacotherapeutics, and toxicology of drugs affecting the autonomic and central nervous systems. Fall quarter. Prerequisites: Biology 331, 332, and 333 and Pharmaceutical Chemistry 341 and 342. 6 hours.
432. Pharmacology and Toxicology 2 (4 + 3). Pharmacodynamics, Pharmacotherapeutics and toxicology of drugs affecting the cardiovascular, hematic, reproductive, and excretory systems and the metabolism. Winter quarter. Prerequisite: Pharmacology 431. 5 hours.

433. Pharmacology and Toxicology 3 (4 + 3). Pharmacodynamics, pharmacotherapeutics, and toxicology of locally acting drugs, chemotherapeutic drugs, and antibiotics and the toxicology of agents other than drugs. Spring quarter. Prerequisite: Pharmacology 431. 5 hours.

550.* Pharmacological Problems (0 + 3, 0 + 6, or 0 + 9). Research to acquaint the student with literature searching, experimental design, experimental methods and techniques, data analysis, and scientific reporting in pharmacology. Fall, winter, and spring quarters. Prerequisites: Pharmacology 431 and departmental approval. 1, 2, or 3 hours.

DEPARTMENT OF PHARMACOGNOSY
AND NATURAL PRODUCTS
(Department 304)

Associate Professor Awad (Chairman).

421. Introduction to Pharmacognosy (1 + 3). An orientation in the field of Pharmacognosy: History, modern trends, nomenclature, identification, evaluation, extraction, chemical classification and therapeutic use of the official crude and unorganized drugs. 2 hours.

422. Pharmacognosy (3 + 3). The origin, structure, biosynthesis, chemical and physical properties of purified natural products of biological origin, with emphasis on their practical application in pharmacy. Covers carbohydrates, glycosides, tannins, proteins, enzymes, vitamins and biologicals. Prerequisites: Pharmacognosy 421, Biochemistry 322, Microbiology 361. 4 hours.

423. Pharmacognosy (3 + 3). A continuation of Pharmacognosy 422, covering lipids, volatile laws and alkaloids. Prerequisite: Pharmacognosy 422. 4 hours.

441.* Medicinal Plant Propagation and Cultivation (1 + 3). Propagation, cultivation, collection, preservation, screening, planning and development of a medicinal garden. Field trips. Spring quarter. Prerequisite: Departmental approval. 3 hours.

541.* The Organic Constituents of Medicinal Higher Plants (3 + 0). Chemistry and interrelationships of constituents obtained from pharmacognostical plants; outline of the methods of isolation, purification, identification and structure determination. Fall quarter. Prerequisite: Departmental approval. 3 hours.

542.* Biogenesis of Natural Products (3 + 0). An outline with discussion and study of research involving biosynthesis of compounds of pharmaceutical interest. Winter quarter. Prerequisite: Departmental approval. 3 hours.
543.* ADVANCED MICROSCOPY (1 + 6). Microchemical and specialized techniques in the detection, separation, and identification of drugs and pharmaceutical preparations. Prerequisite: Departmental approval. 3 hours.

550.* PHARMACOCGNOZY PROBLEMS (0 + 3, 0 + 6, or 0 + 9). Principles of pharmacognosy research, literature pertinent to a specific problem, designing and conducting experiments to solve problems, analyzing the resultant data, and preparing a written report of the work. Offered in the fall, winter, and spring quarters. Prerequisite: Departmental approval. 1-3 hours.

DEPARTMENT OF PHARMACEUTICAL ADMINISTRATION

(Department 305)

ASSISTANT PROFESSOR PREVITE (Chairman).

231. PHARMACEUTICAL ACCOUNTING (3 + 0). Principles and practices of accounting and record keeping applicable to the profession of pharmacy.

232. PHARMACEUTICAL MANAGERIAL ACCOUNTING (3 + 0). Principles and practices involving operating and financial records or reports of a business. Medical or pharmaceutical reports regarding patient health.

550.* PHARMACEUTICAL ADMINISTRATION PROBLEMS (0 + 3, 0 + 6, or 0 + 9). Research problems in pharmaceutical administration. Laboratory work employing some of the modern techniques available in pharmaceutical administration, including the application of basic principles to graduate study and research in pharmaceutical administration.

551. PHARMACEUTICAL LAW (4 + 0). A study of professional ethics and the philosophy, requirements, administration, and enforcement of local, state, and federal laws related to the practice of the profession of pharmacy.
552. **Pharmaceutical Marketing** (3 + 0). Facts, considerations, and principles which underlie the flow of drug products, and the availability or use of pharmaceutical and other professional services from production to consumption. Principal economic, legislative, and social forces affecting the health-care industry are discussed, and resulting policies and procedures are appraised.

553. **Pharmaceutical Management** (4 + 0). Organization policies, planning, and controlling the relation of pharmaceutical services, professional practice, and pharmacy operation to general business activity, patients, the human service professions, and the public health.

**DEPARTMENT OF MICROBIOLOGY**

*(Department 306)*

**Associate Professor Mallin (Chairman).**

361, 362. **Microbiology** (3 + 3). General and medical microbiology. General survey of bacteria, yeasts, molds, viruses and rickettsia found throughout nature, their relation to disease. Biological products, immunology, chemotherapy, including antibiotics. Prerequisite: One year of general biology, or botany-zoology. 8 hours.

461.* **Parasitology** (2 + 0). The principle protozoan, arthropodal, and helmithic infestations of man and domestic animals. Prerequisite: Consent of instructor. 2 hours.

462.* **Virology** (2 + 0). Viral and rickettsial infections menacing to the health of man and animals, diagnosis and control procedures (immunization), relations of viruses to concepts of biochemistry and genetics. Prerequisite: Consent of instructor. 2 hours.

464.* **Clinical Pathology and Hematology** (1 + 3). Routine diagnostic tests performed in hospital laboratories. Selected tests involving blood chemistry, serology, and uninanalysis will be performed. Prerequisite: Consent of instructor. 2 hours.

502. **Principles and Practices of Public Health** (3 + 0). Individual and community aspects of public hygiene; epidemiology and prophylaxis and violence; the major types of illness (nutritional, metabolic, mental, infections, environmental, occupational). Prerequisites: Microbiology 361, 362, Toxicology, Statistics. 3 hours.

550.* **Microbiology Problems** (0 + 3, 0 + 6, or 0 + 9). Documentation, manipulative, and intellectual skills of investigation in the biologic science areas of interest in pharmacy. Prerequisite: Consent of the instructor. 1-3 hours.

**SPECIAL NOTICE**

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 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
The College of Law Building
College Of Law

Dr. 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.

The student must present acceptable character reference and a satisfactory score on the Law Aptitude Test (LSAT).

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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* Deceased February 26, 1969
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Morton L. Mallin, B.S. (P.C.P. & S.), M.S. (Hahnemann), Ph.D. (Cornell), 1964, Associate Professor of Microbiology, Chairman, Department of Microbiology

* Deceased, April 30, 1969
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