 liberal arts

 engineering

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 ohio northern university bulletin

 1968/69 CATALOG
Anthropology students travel West / Ohio Northern marching band.
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 any combination of History, Languages, and Natural Sciences.

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

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

High school seniors whose ability and maturity warrant may, upon recommendation of the high school principal and with the approval of the Admissions Committee, take a limited amount of college work for credit either on campus or in Evening Classes during 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 basic GENERAL EDUCATION UNITS required of all students. They are listed by academic divisions; optional alternate courses 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 basic GENERAL EDUCATION UNIT; however, the choice of the discipline belongs to the student. The 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.

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 Field. The candidate for a degree must complete in a logical sequence a major of not less than forty-five quarter hours nor more than sixty (excess hours permitted in music). The faculty adviser will assist the student in planning this major not later than the last quarter of the second year. Candidates for the degree of Bachelor of Arts who expect to teach in the public school should satisfy professional education requirements and will have a member of the Department of Education for a professional adviser. If teacher certification requires more than sixty quarter hours in the major field, they must be in excess of the total hours required for graduation.

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

- Art
- Biology
- Business Administration and Economics
- Chemistry
- English
- Foreign Language
- History
- Mathematics
- Music
- Philosophy and Religion
- Physics
- Political Science
- Psychology
- Sociology
- Speech and Theater
THE DEGREE OF BACHELOR OF SCIENCE

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

THE DEGREE OF BACHELOR OF SCIENCE IN EDUCATION

Prescribed: The basic GENERAL EDUCATION UNITS listed under the requirements for the Bachelor of Arts Degree also apply for the Degree of Bachelor of Science in Education.

Consult the Departmental curricula for other specified coursework involved in the completion of requirements for teacher certification.

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

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

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

A grade of "C" or better is required in all Professional Education courses and in all courses in the major field. Students with degrees from other accredited institutions may qualify for teacher certification in the Department of Education by completing the required professional courses.
The Department of Education permits the completion of degree requirements and/or recommendation for teacher certification only when a student demonstrates such traits as are deemed necessary for competence in teaching.

PRE-PHARMACY

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

COMBINATION CURRICULA

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

The Arts-Engineering Program, a five-year curriculum, was introduced in 1964 for the superior student challenged by the rewards of understanding more fully both human society and current technology. The student enrolls 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-PROFESSIONAL CURRICULA LEADING TO THE BACHELOR OF ARTS DEGREE

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

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

RELIGIOUS EDUCATION

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

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

PRE-THEOLOGY

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

PRE-LAW

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

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

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 including physical education.

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

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

WARNING AND PROBATION

A quality point average of 2.0 is necessary for graduation.

If a student's quality point average for any quarter falls below 2.0, the student will be placed on warning.

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

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

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

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's degree, the student must complete a minimum of 180 quarter hours of academic work plus three hours of physical education, with an accumulative qualitative point average of at least 2.0. Completion of the prescribed GENERAL EDUCATION UNITS accounts for the equivalent of 60 quarter hours of academic work; hence, the student must complete the GENERAL EDUCATION UNITS and an additional 120 quarter hours of academic work in order to fulfill minimum graduation requirements.

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 111)

ASSOCIATE PROFESSOR WEST (CHAIRMAN), ASSISTANT PROFESSORS DeVORE, GORDON, GRIMES.

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

Requirements for certification in Art Education are described under Teacher Education in this catalog.

100. Art. Analysis of the visual arts through selected works from the past and present. (Recommended elective for art majors). 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 two 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, media, 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. Methods and techniques. May repeat for total of 6 hours. 3 hours.

305. Ancient/Medieval Art. Art forms and styles from pre-historic times to the 14th century. 3 hours.

315. Renaissance and Baroque. Art forms and styles during the 15th, 16th, and 17th centuries in Italy and Northern Europe. 3 hours.

325. Impressionism and Post Impressionism. Emphasis on developments in French Art between the Revolution of 1848 and 1900. 3 hours.
335. **Contemporary Trends.** 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. Prerequisite: 15 hours of courses in Art Department or permission. May repeat to total of 12 hours. 3 hours.

370. **Lithography.** Methods and techniques. Prerequisites: Art 153, 163, and 3 hours of 210 or permission. May repeat to total of 6 hours. 3 hours.

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

399. **Art Education Methods.** Laboratory-seminar dealing with materials, techniques, and methods of classroom instruction in art. 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 370 and/or 380. 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.

440. **Art Problem.** Independent study in an approved area of the visual arts in which the student has some significant prior experience. Emphasis on experimentation and/or research. Senior Art Majors only. 1 to 3 hours.

490. **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.

**Biology**

(Department 121)

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

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. General 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, 201 or 202, 223, 301, 331, 343, 430 and fifteen (15) credit hours elected from: 201, 202, 213, 302, 303, 332, 333, 423, 440, 450, microbiology 361, 362 (offered in the college of Pharmacy.)

Preparation in the related areas of mathematics, statistics, chemistry and physics as determined by the department in consultation with the individual student. (A minimum of 28 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. Prerequisite: General Biology 100. 8 hours.

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 mature, non-reproductive 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.


240. 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. Prerequisite: 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.**

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 (3 + 3)**. 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. **4 hours.**

440. **Biology Investigations by qualified junior and senior Biology majors. 1-3 hours.**

450. **Seminar.** Readings, discussions and reports on problems of historical and current interest in biology. Required of all Biology majors electing Biology 440. **1 hour.**

**BUSINESS ADMINISTRATION AND ECONOMICS**

(Department 131)

Professor Conklin (Chairman); Associate Professor Cooley; Assistant Professor Carlson; Instructors Rassoul, Young; Lecturers DaPore, Gearity, Masi, Kennedy.

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, 192, 133, 202, 203, 322, 352, 353. In addition, students majoring in Economics and Business Administration are required to complete one year of mathematics (Math 193 must be included). Seniors should take a senior seminar in preparation for the senior comprehensive.

100. **Economics.** The origins, characteristics, and functions of our economic organization. A study of current institutional arrangements, the use of appropriate tools of economic analysis, and a consideration of relevant economic and social goals. **One unit.**
131-132. Principles of Accounting: Fundamental process of accounting applied to service, trading and manufacturing concerns; preparation of working papers and financial statements. 9 hours.

202-203. Principles of Economics: An analytic description of our economic system; the price system, money and banking, monetary and fiscal policy, the economy of producers and consumers income and employment, current economic problems. 6 hours.

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

312. Cost Accounting: Accounting for manufacturing enterprises with emphasis on job order process and standard cost accounting. Prerequisite: Accounting 133. 5 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.


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

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

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

341. Labor Economics: Labor as a factor in production; labor mobility; theories of the determination of wages, and bargaining theory; history and methods of labor unions, and government relations to labor. 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; case method approach largely used. 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. An introduction to the accounting-management relationship designed to follow the first year of basic accounting, for both accounting and non-accounting majors; the uses of accounting data for managerial decision. Prerequisite: Accounting 133. 3 hours.

371. Salesmanship. The principles, techniques and problems of salesmanship; sales management, recruiting, controlling and evaluating the sales force; market research, channels of distribution and pricing. Prerequisite: Economics 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.

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

383. Intermediate Economic 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. Income and Employment (Macroeconomics). The principles, measurement, analysis, and control of aggregate economic activity; the role of consumption, investment and saving in achieving 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. Auditing. Auditing accounting records and statements, making of working papers and the writing of audit papers for making a complete audit. Prerequisite: Intermediate Accounting 301. 5 hours.

411. Comparative Economic Systems. Capitalism, socialism, fascism and communism as they touch on the economics of pricing, production and distribution. Prerequisite: Economics 202-203. 3 hours.
413. **Budgeting.** Estimating income and expenses; organization for controlling expenditures and for measuring the operating efficiency of the organization. Prerequisite: Accounting 133. 5 hours.

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 Systems.** Modern automated data processing systems; basic concepts and standards, methodology of work and the human factors. Prerequisite: Intermediate Accounting 301. 3 hours.

433. **Data Processing.** The use of automatic computers in accounting systems. Graphic presentations supplement the text. Prerequisite: Accounting 133. 3 hours.

440. **Senior Comprehensive.** Preparation of the student for the Senior Comprehensive examination; integration of ideas and formulation of a philosophy. 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. Test and original sources. Prerequisite: Economics 202-203. 3 hours.

444. **Advanced Topics in Economics and Business Administration.** Examination of a special and somewhat detailed area of economics and/or business administration. Registration with permission of the chairman of the department. 3 hours.

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

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

461. **Investments.** Activities of the finance manager; financial analysis in problem solution; sources and uses of funds; financial reporting and financial statements; capital budgeting and raising of funds; evaluation of securities; case studies. Prerequisite: Economics 202-203. 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: Economics 202-203. 3 hours.
CHEMISTRY
(Department 122)

Professors Bettinger (Chairman), Wilhelm; Associate Professors Goodrich, McClure; Assistant Professors Erbelding, Hart, Hawbecker, Hildahl (Celina Campus).

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

MAJOR IN CHEMISTRY

Two degree programs are available. One leads to the Bachelor of Science degree and is designed primarily for those who intend to pursue graduate study or enter chemical industry at the bachelor's degree level. The other leads to the Bachelor of Arts degree and is designed for those who wish a program with more electives or a chemistry major in preparation for medicine, secondary school teaching, sales or management or any other field which may require undergraduate background in chemistry.

All chemistry majors fulfill basic University and College of Liberal Arts requirements and take Chemistry 141-142, 143, 240, 241-242-243, 321, 340, 341-342-343, (440).

In addition, for the Bachelor of Science, Chemistry 451, 452, 462, 463, two advanced courses, one of which may be chosen from physics or mathematics, German 221-222-223 and a knowledge of simple differential equations are required.

100. Chemistry. Provides an orientation to and understanding of the fundamental nature of physical science with particular emphasis on models and measurements. One unit.

131-132. General Chemistry. Includes basic principles and use of modern theory and periodic relationships to explain observable facts. The laboratory illustrates principles in a quantitative manner and the separation and study of ions in aqueous solution. (3 + 3). Prerequisite: Demonstration of satisfactory background by appropriate examination or Chemistry 100. 8 hours.

141-142. General Chemistry for Majors. The same lecture as Chemistry 131-132 with separate laboratory. (3 + 3). Prerequisite: Chemistry major and demonstration of satisfactory background by appropriate examination or Chemistry 100. 8 hours.

143. Inorganic Reactions and Analysis. The chemistry of the transition elements and application of chemical equilibrium and principles to quantitative analysis. The laboratory demonstrates basic preparative and quantitative techniques. (3 + 6). 5 hours.

172-173. General Chemistry Seminar. Enrollment by invitation of the chairman. Prerequisite: Chemistry 131. 1 hour each.

240. **Sophomore Seminar.** Required of all chemistry majors, others admitted by permission of the chairman. Ten meetings per year. 1 hour.

241-242-243. **Organic Chemistry for Majors.** The same lecture as Chemistry 231-232-233 with separate laboratory emphasizing the synthesis, separation and qualitative identification of organic compounds. (3 + 6). Prerequisite: Chemistry major and Chemistry 132. 15 hours.

270. **Directed Study for Sophomore Chemistry Majors.** Working with a research group and participation in research seminars. 1 hour per year.

321. **Intermediate Chemistry.** Emphasis is placed on selected aspects of inorganic and analytical chemistry. (2 + 6). Prerequisite: Chemistry 143. Corequisite: Chemistry 233 or 243. 4 hours.

340. **Junior Seminar.** Required of all chemistry majors, others admitted by permission of the chairman. Ten meetings per year. 1 hour.


364. **Advanced Organic Chemistry Laboratory.** Corequisite: Chemistry 363. 1 hour.

370. **Directed Study for Junior Chemistry Majors.** Working with a research group and participation in research seminars. 1 hour for two quarters work.

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

440. **Senior Seminar.** Required of all chemistry majors, others admitted by permission of the chairman. Ten meetings per year. 1 hour.

451. **Advanced Inorganic Chemistry.** Chemical principles and bonding theory applied to the study of inorganic systems. Prerequisite: Chemistry 343. 4 hours.

452. **Advanced Inorganic Chemistry Laboratory.** Synthesis and characterization of inorganic compounds. Prerequisite: Chemistry 451. 1 hour.

462. **Advanced Analytical Chemistry.** The theory of instrumental analysis. Prerequisite: Chemistry 343. 4 hours.

463. **Advanced Analytical Chemistry Laboratory.** Application of instrumental techniques to analytical problems. Prerequisite: Chemistry 462. 1 hour.

473. **Advanced Physical Chemistry.** Prerequisite: Chemistry 343. 4 hours.

481-481-483. **Senior Research.** Approval of chairman required. Prerequisite: Chemistry 343. For B.S. degree students only. 6 hours.
Student teacher gains practical experience at an elementary.

EDUCATION
(Department 141)
Professors Behrens, Hanson, Jones, Spencer; Associate Professors Vayhinger (Chairman), Rubeck; Assistant Professors Ellery, Parsons, Van Atta, Hungerford; Instructor Smith.

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.
   2. Favorable recommendations from advisors, Dean of Women or Men, English Department 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 and Bachelor of Science in Education Degree.

   **Professional Education requirements:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Education 100—Education</td>
<td>One unit</td>
</tr>
<tr>
<td>Education 223—Child Development</td>
<td>3 hours</td>
</tr>
<tr>
<td>Education 233—Children’s Literature</td>
<td>3 hours</td>
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<tr>
<td>Education 308—Teaching Arithmetic</td>
<td>3 hours</td>
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<tr>
<td>Education 309—Teaching Science</td>
<td>3 hours</td>
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<tr>
<td>Education 311—Teaching Social Studies</td>
<td>3 hours</td>
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<tr>
<td>Education 312—Teaching Language Arts</td>
<td>3 hours</td>
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<tr>
<td>Education 341—Teaching Reading</td>
<td>3 hours</td>
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<tr>
<td>Education 391—Elementary School Curriculum</td>
<td>3 hours</td>
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<tr>
<td>Education 470-471—Student Teaching</td>
<td>15 hours</td>
</tr>
<tr>
<td>Electives in Education</td>
<td>9 hours</td>
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</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**
   a. **Art Education**
      Provisional Special Certificate (Elementary and Secondary, or Secondary). See Department of Art for program of studies.
   b. **Health and Physical Education**
      Provisional Special Certificate (Elementary and Secondary, or Secondary). See Department of Health and Physical Education for program of studies.
   c. **Industrial Arts Education**
      Provisional Special Certificate (Secondary)
      See Department of Industrial Arts for program of studies.
   d. **Music Education**
      Provisional Special Certificate (Elementary and Secondary). See Department of Music for program of studies.
3. Secondary Education

Requirements for certification in the various secondary teaching fields may be obtained from the Office of the Director of Teacher Education. 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:

- Education 100—Education
- Education 333—Adolescent Growth & Development
  (Prereq: Psych. 100 or 211)
- Education 370—School and Society
- Education 390—High School Curriculum
- Education 450—Methods of Teaching in High School
  or Special Methods of Teaching
  - 452 English
  - 453 Social Studies
  - 454 Mathematics
  - 455 Science
  - 456 Language
  - Music 311, 313 or 315
  - Industrial Arts 423
- Education 480-481—Student Teaching
- Electives in Education

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Education 100</td>
<td>One Unit</td>
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<tr>
<td>Education 333</td>
<td>3 hours</td>
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<td>Education 370</td>
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<td>Education 390</td>
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<td>Education 450</td>
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<tr>
<td>Education 480-481</td>
<td>9 hours</td>
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<tr>
<td>Electives in Education</td>
<td>6 hours</td>
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</tbody>
</table>

**Total** 27 hours

Electives from the following courses:

- Education 313—Educational Psychology
- Education 401—History and Philosophy of Education
- Education 402—School Organization and Administration
- Education 430—Audio-Visual Aids
- Education 460—Evaluation and Measurement

**Total** 27 hours

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**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.

121. Introduction to Education. The teaching profession, its requirements, opportunities, and problems; the nature and functions of our educational system. 3 hours.

313. Educational Psychology. The learning process and conditions that promote learning. Prerequisite: Psychology 100 or 211. 3 hours.
401. History and Philosophy of Education. Modern educational practice; historical changes in instructional processes and ideas; educational beliefs and points of view; the purpose of education in 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.

430. Audio-Visual Aids in Education. Preparation, study, and evaluation of audio-visual materials; their uses in the promotion of the learning process. 3 hours.

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

460. Evaluation and Measurement of Pupil Progress. Evaluation and measurement as they apply to instruction. 3 hours.

ELEMENTARY EDUCATION COURSE DESCRIPTION

223. Child Development. Characteristics of the child at different levels of maturity; physical, mental and emotional growth; growth and organization of meanings; control of social and ethical behavior; development of personality. Prerequisite: Psychology 100 or 211. 3 hours.

233. Children’s Literature. Designed to help strengthen knowledge and appreciation of children’s books. Audio-visual 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 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.
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.

391. **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.

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. **Arithmetic and Science for Slow Learning Children.** Methods, materials for basic arithmetic and science concepts; practical application. 3 hours.

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.

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; scholarship 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"; 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**

333. **Adolescent Growth and Development.** The adolescent, his physical, social, emotional, and intellectual development; in accordance with genetic constitution and environmental forces from birth. Prerequisite: Psychology 100 or 211. 3 hours.
370. **School and Society.** Schools in relation to their supporting society; democracy in its relation to public schools; the responsibilities of educators to the community and to the school; the nature, type, and limitations of both the official and unofficial controls of the public school. Prerequisite: Education 333. 3 hours.

390. **The High School Curriculum.** Secondary school curriculum standards, practices, instructional materials, curriculum development, curriculum functions, changes and trends. Prerequisite: Education 333. 3 hours.

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

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

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

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

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

456. **Teaching Methods in High School Foreign Language.** Similar to Education 450 with emphasis on the student’s major teaching area. 3 hours.

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; weekly seminar on campus. Prerequisites: senior rank; cumulative average of 2.25 or higher 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, 333, 370, 390, 450 or Special Methods; teach in major teaching field; 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 12 hours.

**ENGLISH**

(Department 112)

**Professor Hastings; Associate Professors Dornbusch (Chairman), Bennett, Price; Assistant Professors T. Banks, Belch, Thomas; Instructors R. Arthur, S. Arthur, Cisler, Fleming, Hagen, Hunt, Matthew, E. Miller (part time), Oliver; Lecturer L. Banks.**

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, understand-
ing, 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.

For a major in English the following courses are required: 200; 201-202-203; 211-212-213 (For majors, 201-202-203 are prerequisites for 211-212-213); 311 or 312 or 313; four of the following courses: 321, 322, 323, 324, 325; 351-352; 410 (prerequisites: 351-352); 440.

These requirements meet the 48 hour minimum for a major in English. Majors are also encouraged to take up to 12 hours of electives in English (a maximum of 60 hours in English). Two years of French or German and one year of English History, preferably taken in the major’s junior year, are also required. 100, 101, 102 do not count toward a major, nor does any course with a grade below “C.”

**ENGLISH COURSES**

100. ENGLISH. Critical thinking and writing based upon studies in expository and narrative prose. **One unit.**

101. ENGLISH. Critical thinking and writing based upon studies in fiction and prose drama. **One unit**

102. ENGLISH. Critical thinking and writing based upon studies in poetic drama and poetry. **One unit.**

200. PRINCIPLES OF LITERARY CRITICISM. An introduction to critical approaches to literature, applied to specific works in the various genres. **3 hours.**

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

211-212-213. INTRODUCTION TO AMERICAN LITERATURE. A chronological study of the poetry and prose of the major American writers from the Puritan Age to the modern period, the development of American thought and literary forms. **9 hours.**

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

301-302. THE BRITISH NOVEL. The development of the novel as a literary form. 301—from Defoe to Austen; 302—from Dickens to Joyce. **6 hours.** Alternate years. Offered 1968-69.

303. TWENTIETH CENTURY AMERICAN FICTION. A study of the development of the American novel after World War I, with emphasis on the major novelists. **3 hours.**
304. **The Short Story.** A study of the works of the master short story writers; understanding and appreciation of the short story as a literary form. 3 hours.

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

321. **Milton and His Age.** *Paradise Lost, Samson Agonistes,* and Milton’s major lyric poems; Donne and the metaphysical tradition; the 17th Century background. 3 hours. Alternate years.

322. **Restoration and the Eighteenth Century.** The prose and poetry of the major writers of the Neoclassical Period, beginning with Dryden and the Restoration and ending with Blake, the forerunner of the Romantic Period. 3 hours. Alternate years.

323. **The English Romantic Movement.** Poetry and prose of the early nineteenth century with emphasis upon the selected writings of Wordsworth, Coleridge, Byron, Shelley, and Keats. 3 hours. Alternate years.

324. **The Victorian Period.** Typical Victorian attitudes, conflicts, and conditions as reflected in the major prose and poetry of the age. 3 hours. Alternate years. Offered 1968-69.


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

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

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

341. **Poetry Writing.** The discipline and technique of writing poems. 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.
410. CHAUCER AND HIS AGE. A chronological study of Chaucer’s life in relation to his literary development; the chief literary forms of the Middle Ages with special reference to the Medieval Romance; skill in reading Middle English. Prerequisite: 351-352 or permission of the chairman. 3 hours.

440. THE SENIOR SEMINAR. Seminars and independent study for the preparation of a thesis. 3 or 6 hours.

FOREIGN LANGUAGES

(DEPARTMENT 113)

PROFESSOR GATES (CHAIRMAN); ASSISTANT PROFESSORS ANIDO, MARTINEZ, NAGY, PELLER, SAGONOWSKY; INSTRUCTORS DALY, 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; 414.

German 221-222-223; 321-322-323; 324-325-326; 421-422-423; 420.

Spanish 241-242-243; 341-342-343; 344-345-346 or 347-348-349; 441-442-443; 440.

For a minor in French, German or Spanish, 24 hours required above the 100 level course series. The sequence is not prescribed, but will vary in accordance with the student’s abilities as indicated by his scholastic record.

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.


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. Prerequisites: French 211-213, 311-313, or the consent of the instructor. *9 hours.*

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 or consent of instructor. *9 hours.*

414. **French Seminar.** For seniors majoring in French. *3 hours.*

415. **French Seminar.** For seniors majoring in French. *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, or the consent of the instructor. 9 hours.

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

424. German Seminar. For seniors majoring in German. 3 hours.

425. German Seminar. For seniors majoring in German. 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, or the consent of the instructor. 9 hours.
347, 348, 349. **Spanish-American Literature.** Main currents of Spanish-American literature. Prerequisite: Spanish 241-243, or the consent of the instructor. 9 hours.

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

450. **Spanish Seminar.** For seniors majoring in Spanish. 3 hours.

451. **Spanish Seminar.** For seniors majoring in Spanish. 3 hours.

**Russian**

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

107. **Russian.** Outstanding contributions of Russian-speaking countries to the cultural heritage of the Western world in the visual arts, music, theater and literature. *One unit.*

131-132-133. **Elementary Russian.** To develop the ability to understand, speak, read, and write Russian; functional rather than formal grammar; simple conversation based on practical, everyday situations; elementary reading based on Russian life, customs and manners. *Three class periods and two hours of scheduled laboratory practice per week. 12 hours.*

231-232-233. **Intermediate Russian.** Review of grammar and pronunciation; conversational practice and reading; occasional lectures on Russian history, art and civilization; slides, films and recordings. *Three class periods and two hours of scheduled laboratory practice per week.* Prerequisite: Russian 131-133. 12 hours.

**Latin**

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

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

**Health and Physical Education**

(Department 143)

Professor Lamb; Associate Professor English (Chairman); Assistant Professors Roberson, Michael; Instructors, Ludwig, Miller, Kerr, Palsisano, Middleton, Covert, Lauth, Helms; Lecturer, McCabria.

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.

PROFESSIONAL CURRICULUM FOR TEACHERS

For students who wish to specialize in the field of health and physical education a four-year professional curriculum is offered leading to the degree of Bachelor of Science in Education and to a special state four-year Provisional Certificate. A copy of this professional curriculum may be obtained from the Chairman of the Department of Physical Education. In addition to the professional 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 inter-collegiate program.
The following courses indicated by 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.

120. Nutrition. Nutrition, taught at Lima Memorial Hospital only, is built upon knowledge of the physiology of digestion (from anatomy and physiology); and chemical characteristics of food, enzymes and metabolic end products; factors which influence diets ordered for certain diseases and psychological significance of environment. (For nurses only).

*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) Courses 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. Formerly Physical Education 101-103. 1 hour each.

*144-145-146. Physical Education for Majors. (Women) Required of all women students majoring or minoring in physical education in place of Courses 004-005-006. Activities in season, including field hockey, dance, basketball, archery, gymnastics, softball, and tumbling. Formerly Physical Education 104-106. 1 hour each.

*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, flashlight, games of low organization, parallel bars, badminton, weight lifting, archery, golf, and volleyball. 1 hour each.

*204-205-206. Physical Education for Majors. (Women) Required of all women students majoring in physical education in place of the second year physical education service courses. Activities in season, including speedball, games of low organization, badminton, volleyball, bowling, trampoline, track, and field, golf, and tennis. 1 hour each.

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

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

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

*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. Formerly Physical Education 133. 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.

**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 team, individual and dual sports. Lectures, reports, demonstrations, and practice. Archery, speedball, volleyball. 3 hours.

*325. Theory of Coaching for Women. To prepare students in physical education to coach athletics in secondary schools; technique, basic principles and fundamentals of team, individual and dual sports. Lectures, reports, demonstrations, and practice. Basketball, badminton, bowling.

*326. Theory of Coaching for Women. To prepare students in physical education to coach athletics in secondary schools; technique, basic principles and fundamentals of team, individual and dual sports. Lectures, reports, demonstrations, and practice. Softball, tennis, track and field.

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

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 Course 341 except it applies to basketball officiating. 3 hours.
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.

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. Formerly Health Education 123. 3 hours.

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.

DRIVER EDUCATION. For those who plan to teach driving in the public schools; classes and driving demonstrations daily. 3 hours.

PROBLEMS IN PHYSICAL EDUCATION. Specific problems in physical and health education open to properly qualified students. Time to be arranged. 1-3 hours.

STUDENT TEACHING. See Education 480. 9 or 12 hours.

HISTORY AND POLITICAL SCIENCE

(DEPARTMENT 132)

PROFESSORS HILLIARD (CHAIRMAN), DARLINGTON, MILNAR; ASSISTANT PROFESSORS DAVIS, IGNAIAS, SOBERS; INSTRUCTORS BARKER, HAMMOND, ROSSI, WOOD.

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. 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, or consent of the instructor. 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, or consent of the instructor. 9 hours.

321. English History to 1603. 3 hours.

322. English History: 1603 to 1832. 3 hours.

323. English History: 1832 to the Present. 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.

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.

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, or the consent of the instructor. 9 hours.

341-342. American Foreign Relations. The inception, development, and present interpretation of the outstanding foreign policies of the United States; the emergence of the United States as a world power; the trend from isolation. Prerequisite: History 211, 212, 213. 6 hours.

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.

351, 352. Ancient History. The development of civilization from pre-history 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. 3 hours.

355. Latin American History. Recent Latin America. 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.

362. Recent American History. An intensive study of the major factors in United States history since 1928. Prerequisite: History 211, 212, 213, or consent of the instructor. 3 hours.

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 with particular emphasis on political, social, and cultural changes. Prerequisite: consent of the instructor. 3 hours.

369. History of Southeast Asia. Burma, Thailand, Malaysia, Indonesia, and India from 1850 to the present. Prerequisite: consent of the instructor. 3 hours.

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, or consent of the instructor. 9 hours.

377. History of Africa. (Sub-Saharan). From earliest time through World War I with emphasis on the 19th and early 20th century. Prerequisite: consent of the instructor. 3 hours.

378. History of Africa. (Sub-Saharan). Contemporary Africa. Prerequisite: consent of the instructor. 3 hours.

381. The Westward Movement in the United States. Territorial expansion from colonial times to 1860; Indian relations; land policies; transportation and trade. 3 hours.

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

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

411, 412, 413. Russian History. Russia from Peter the Great to the present. Emphasis upon economic and social development, political and religious traditions, revolutionary developments, post-war U.S.S.R. and Russia in European affairs. 9 hours.

433. 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.

440-441. Honors Seminar. Supervised reading in an area selected by the student in consultation with a member of the staff. Discussions and reports. Limited to qualified seniors upon departmental approval. 3 to 6 hours.
Rev. Martin Luther King / Symphony director Max Rudolf with press.
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.

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. 3 hours.

334-335-336. Comparative Government. A structural-functional approach to comparison of the governments of Europe (334); Latin America (335); and Afro-Asia (336). Prerequisite: Political Science 201-202-203, or consent of the instructor. 9 hours.

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.

347. American Political Organizations. The roles, functions, and interactions of organized political groups in the governmental system of the United States. Prerequisite: Political Science 201-202-203, or the consent of the instructor. 3 hours.

363-364. Public Administration and Organization. The nature and function of public organizations; structure, management, and control. Prerequisite: Political Science 201-202-203, or the consent of the instructor. 6 hours.

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


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

384-385-386. Western Political Thought. European and American political thought: Pre-Socratic to Locke (384); Burke to modern times (385); American political thought (386). Prerequisite: Political Science 201-202-203, or the consent of the instructor. 9 hours.
421. **Government of the Soviet Union.** Demographic, historical, and ideological basis of Soviet rule. The social, political, and governmental structure. The Church, army, courts, and organs of police. 3 hours.

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

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

432. **Administrative Law.** Development of governmental regulation of economic affairs in the United States, provisions of the U.S. Constitution, leading court opinions, and the regulatory laws of recent years. Prerequisite: Consent of the instructor. (Formerly Econ. 432). 3 hours.

450. **Individual Honor Study.** Selected techniques and research materials for the study of governmental and political behavior. Intensive study of a suitable program with a written and an oral presentation of a paper. Open to qualified seniors majoring in the department. 3 to 6 hours.

**INDUSTRIAL ARTS**

(Department 142)

**Associate Professor Kain (Chairman), Assistant Professor Rex**

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

In the course areas attention is directed toward researching, experimenting, inventing and creative artistry, involving problem-solving situations derived from both theory and practice of the arts and sciences. The courses are organized to provide a basic professional-technical education for persons preparing to teach the arts of industry and technical subjects in the public schools.

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, 210 Handicrafts for Teachers, 241 Finishing Methods and Materials, 311 Graphic Arts, 323 Lapidary and Jewelry, 430 Photography, 440 Special Problems, and 460 Industrial Materials and Processes. These courses have no prerequisite.

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

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

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

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

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

101. INDUSTRIAL ARTS ORIENTATION. An introduction to Industrial Arts; philosophical origins and contemporary practices. The fundamental procedures, operations, and the special equipment for each of the several areas of Industrial Arts are briefly explored through laboratory activities and public school visitations. 3 hours.

111. ENGINEERING GRAPHICS I. Use of instruments, applied geometry, lettering, orthographic projection, and pictorial drawing. Offered in the College of Engineering. 2 hours.

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

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 manipulative processes of duplicating written communications: process printing, mimeographing, spirit duplicating, photographecs, 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.*

321-322. **Ceramics.** (See Department of Art, Ceramics 321-322.)

321. **Metalwork Technology.** Fundamentals of general metalwork; layout and pattern drafting, bending, forming, shaping, 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 or permission of the department chairman. *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. Prerequisite: 113 Drawing, 101 Industrial Arts, 112 Wood Technology. *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.*

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, I.A. 101, Wood Technology 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. 111-112. *5 hours.*
412. LABORATORY PLANNING AND EQUIPMENT SELECTION. The architectural features, selection, arrangement, and maintenance of equipment of the modern Industrial Arts laboratory. Prerequisite: Same as 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.

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

451. AUTOMOTIVES 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.

MATHEMATICS

(DEPARTMENT 123)

PROFESSOR BERTON (CHAIRMAN); ASSISTANT PROFESSORS D. DALY, K. KUHNS, LHAMON, C. ROIDER; INSTRUCTORS BOWSHER, EVANS, FRANK, TAUSSIG, TAYLOR, J. VANNORSDAL; WONG; LECTURERS HAYES, PRICE.

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

In general, the sequence 100-172-173 is designed for prospective elementary school teachers; the sequence 100-192-193 is designed for prospective social and life scientists; and the "calculus" sequences, 151-152-153-251-252 and 241-242-243, are 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. Advanced placement is encouraged.

Mathematics 100, as part of the general requirements, must be passed by all students. Students who take one of the "calculus" sequences should take 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 examination.
Students majoring in mathematics must complete either Mathematics 243 or 252 and then complete at least 25 credit hours in mathematics courses at the 300/400 level including Mathematics 341 or 351, 451, and 452 to make up a total of 45 hours in mathematics. All courses to be counted must have been completed with a grade of C or better.

All mathematics majors are encouraged to take Digital Computation 101 and 102 at the Computer Center early in their program. Further, they will be encouraged to take courses in which they will apply their mathematics in other departments. Physics 231-3 will be especially useful to those who pursue the Bachelor of Science Program.

The Department of Mathematics offers two basic programs, one leading to the Bachelor of Science Degree and the other to the Bachelor of Arts Degree. The first is designed for those who will be applying their mathematics in business and industry directly upon graduation. The other program is designed for those who will be taking further study in graduate school. Persons taking the Bachelor of Arts Program will be required to complete French 213, German 223, or Russian 233.

Since preparation for secondary school teaching and graduate study are similar, students who plan to go into teaching will be encouraged to take the Bachelor of Arts Program.

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

151. Elementary Functions. The real number system; inequalities; radicals and exponents; exponential, logarithmic, trigonometric, and inverse trigonometric functions; theory of equations, systems of equations, binomial theorem, and sequences. 5 hours.

172-173. Fundamental Mathematics. Relations, theory of arithmetic, systems of numeration, integers, real numbers, order relations, exponents, logarithms, introduction to analytic geometry. Prerequisite: Mathematics 100. 3-3 hours.

192. Introductory Calculus. Essentials of algebra and analytic geometry, concept of a function, limits, derivatives, antiderivatives, definite integral, applications to business and the social and life sciences. Prerequisite: 2½ units of high school mathematics and/or entrance examination scores. Mathematics 100 is recommended. 5 hours.

193. Probability and Statistics. Random variables, expectation, mean, variance, standard deviation, law of large numbers, infinite sample space, moment generating functions, density and distribution functions, statistical inference. Prerequisite: Mathematics 192 or permission of the department. 5 hours.

241-242-243. Calculus and Analytic Geometry. This sequence is for students in the four year engineering program and for advanced placement of freshmen in the College of Liberal Arts. It has the same content as Mathematics 152, 153, 251, and 252. Mathematics 243 should be followed by 341. 5-5-5 hours.

152-153-251-252. Calculus and Analytic Geometry. Relations, functions, limits, continuity, differentiation of algebraic functions, vectors in a plane, integration, lines, conics, differentiation and integration of transcendental functions, parametric equations, polar coordinates, methods of integration, applications, solid analytic geometry, vectors, infinite series, partial differentiation, multiple integration, determinates and matrices. Prerequisite: Mathematics 151 or its equivalent in high school work. 5-5-5-5 hours.
305. **Electronic Computer Concepts.** Nondecimal systems, Boolean algebra, introduction to several computer languages, familiarization with several types and makes of computers, effort being made to show the student how the computer performs its logic. Prerequisite: Mathematics 252 or 341. 4 hours.

310. **College Geometry.** Incidence, ordering, separation, and congruence, as they are involved in non-Euclidean, incidence, affine, and Euclidean geometries. Prerequisite: Mathematics 243 or 252. 4 hours.

320. **History of Mathematics.** The origin and growth of mathematical concepts, with emphasis on the development of ideas but with personal glimpses of some of the men who made major contributions. Prerequisite: Mathematics 243 or 252. 3 hours.

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

350. **Linear Algebra.** Vector spaces, linear mappings, linear equalities, matrices, linear inequalities, convex sets, inner product, determinants, quadratic forms, eigenvalues, computer applications. Prerequisite: Mathematics 243 or 252. 3 hours.

351. **Differential Equations I.** Ordinary differential equations of the first order, linear differential equations with constant coefficients, simultaneous linear differential equations, applications to mechanical and electrical circuits. Vector algebra. Prerequisite: Mathematics 252. 5 hours.

352. **Differential Equations II.** Fourier series, finite differences, Laplace transforms, partial differential equations. Bessel functions and Legendre polynomials. Prerequisite: Mathematics 341 or 351. 5 hours.

353. **Vector and Complex Calculus.** Vector calculus, complex calculus, analytic functions, infinite series over the complex plane, theory of residues, conformal mapping. Prerequisite: Mathematics 341 or 351. 5 hours.

382. **Advanced Statistics.** Probability spaces, random variables and sampling, multivariate distributions, law of large numbers, estimation of parameters, central limit theorem, confidence intervals, regression sampling and testing hypotheses. Prerequisite: Mathematics 252. 5 hours.


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

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

451. **Introduction to Modern Algebra.** Rings, integral domains, integers, fields, rational numbers, real numbers, complex numbers, polynomials, groups. Prerequisite: Mathematics 341 or 351. 5 hours.
452-453. **Advanced Calculus.** Intensive study of the concepts of limit and continuity, sequences, series, functions of several variables, partial differentiation, functional dependence, Jacobians, Lagrangian multipliers, theory of integration, Reimann Stieltjes integral, uniform convergence. Prerequisite: Mathematics 341 or 351. 3-3 hours.

Chorus-choir director sings original composition for Choral Cabaret 20th anniversary.

**Music**

(Department 152)

Professor Roeder (Chairman); Associate Professor Weitz; Assistant Professors Sonntag, Lasko; Instructors Doudna, Lautenbach; Lecturer Firszt.

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

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

Major performance area 24 hours
Secondary performance area 12
Theory of Music 12
  (Harmony, sight-singing, ear-training)
Counterpoint 3
Arranging (vocal or instrumental) 3
Historical Approach to Music Literature 9
Conducting (General conducting and techniques) 2
  (Choral conducting and materials or instrumental conducting and materials)
Participation in a performing group 6
Senior recital —

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BACHELOR OF SCIENCE IN EDUCATION

*DEPARTMENTAL REQUIREMENTS:

Major performance area 12 hours
Secondary performance area 6
Theory of Music 12
  (Harmony, sight-singing, ear-training)
Counterpoint 3
Arranging (vocal or instrumental) 3
Historical Approach to Music Literature 6
Conducting (general conducting and techniques) 2
  (Choral conducting and materials or instrumental conducting and materials)
Voice Class (materials and techniques) 2
Piano Class (materials and techniques) 2
Instrumental classes (string, woodwind, brass, percussion) 6
  (Materials and techniques)
Music teaching methods 6
Participation in a performing group 9

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APPLIED MUSIC

020. Voice. Individual instruction in vocal production including the principles of breathing, proper diction, articulation, and the study of standard repertoire. Opportunities are offered those prepared for performance both on and off campus. 1-2 hours per quarter.

021. Piano. Individual instruction in piano technique and the study of standard repertoire. Opportunities are offered those prepared for performance both on and off campus. 1-2 hours per quarter.

*Required courses in Education including Student Teaching are listed in the Department of Education section of this catalog.
022. ORGAN. Individual instruction in organ technique and the study of standard repertoire. Ability in piano technique sufficient to warrant organ instruction is required. Preparation for church and concert work including the best organ literature and the principles of modulation, accompaniment and improvisation. 1-2 hours per quarter.

023. STRINGS. 1-2 hours per quarter.

024. WOODWINDS. 1-2 hours per quarter.

025. BRASSES. 1-2 hours per quarter.

026. PERCUSSION. 1-2 hours per quarter.

Individual instruction on instruments of the orchestra and band including technical facility, intonation, tone production, and the study of standard repertoire. Opportunities are offered those prepared for performance both on and off campus.

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.

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.

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. 8 hours.

211-212. Theory of Music. Altered chords, non-harmonic tones, chromatics, and advanced modulation. Analytical technique of music compositions and the study of Musical Form from the motive and song-form to the sonata and contrapuntal forms. 8 hours.

213. Choral Arranging. Development of technical facility for arranging music to be sung by choirs, glee clubs, and vocal organization. 3 hours.

223. Instrumental Arranging. Knowledge of the instruments of the orchestra and band and training in technical facility for arranging music to be played by bands, orchestras, and instrumental organizations. 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.

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

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

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

320. Class Voice. Vocal production including posture, diction, articulation and the study of materials for use in solos, ensembles, and choirs. 2 hours per quarter.

330. Class Piano. Group instruction in the technique of piano performance and accompanying. The playing of general song literature and hymns of the church. Advanced work in improvisation, modulation, and extemporaneous harmonization of melodies are included dependent upon the progress of the student. 2 hours per quarter.

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.

440. Special Problems in Music. Open to senior music majors only; independent study in the field of choice. 1-3 hours per quarter.
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.

470 or Ed. 470. Supervised Teaching in the Elementary Schools. 6 hours per quarter.

480 or Ed. 480. Supervised Teaching in the Junior-Senior High School. 6 hours per quarter.

PHILOSOPHY AND RELIGION

(Department 115)

Professor Tinsler (Chairman); Associate Professor Hinderliter; Assistant Professors Hodges, Vannorsdall (on leave), Whipple, Becker.

Field of Concentration (Interdisciplinary major)

A field of concentration of 45 hours, exclusive of the core course, 231-252-233, constitutes a major in Philosophy and Religion, and shall include the following courses: Bible History 254-255-256; Logic and Introduction to Philosophy 234-235-236; St. Paul and Church History 351-352-353; and the History of Philosophy 311-312-313. (In addition, General Psychology 211 and General Sociology 241 are prescribed). In the Senior year, Problems in Philosophy 430 or Problems in Religion 450, according to the student’s greater interest, conclude the major. In the Junior and Senior years, electives in Philosophy or Religion or both are to be taken to make a total of at least 45 hours. (The Psychology and Sociology may be used to meet one of the units in the Social Sciences requirement).

PHILOSOPHY

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

100. Philosophy. A study of what philosophy is and what it attempts to do; a course dealing with 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.

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

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

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

331. The Classical Period of Greek and Roman Philosophers.

332. The Medieval and Renaissance Periods.


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

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

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

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

RELIGION

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

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.

252. Introduction to Religion. Religion as the vital experience and growing conviction of real people facing real problems in real life situations, with a careful examination of the contrast between the religion of primitive and of advanced cultures. 3 hours.

253. The Message of Jesus Christ. The teachings of Jesus Christ, as recorded in the New Testament Gospels; their personal and social application to everyday life. 3 hours.

254-255-256. Introduction to the Bible. The history and religious thought of the Hebrew and early Christian peoples as recorded in the Scriptures, in relation to their cultural, political, and religious environments. The fall quarter traces this history from early times to Isaiah of Jerusalem; the winter quarter from Jeremiah through the Inter-testamental period; and the spring quarter from Jesus through Paul and the beginnings of the Early Church. 9 hours.
Northern defeats 1968 NAIA basketball champions during season, but loses to them in district play-offs. Polar Bear wrestlers post 9-3 record for 1968 defeating some large universities.
351. The Life and Letters of St. Paul. The development of the early Church and the relation of St. Paul to this work as revealed in the Book of Acts and in the Letters of Paul. Prerequisite: One year of Religion. 3 hours.

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

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

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

452. Philosophy of Religion. The philosophy underlying such religious concepts as God, soul, freedom, prayer, destiny, evil, and immortality. Credit applicable to either philosophy or religion. Prerequisite: 231-232-233 or a one-year course in philosophy or religion, preferably both. 3 hours.

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

454. World Religions. The major living religions of the world. Prerequisite: Same as 452. 3 hours.

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

Physics

(Department 124)

Professor Abele (Chairman); Associate Professors Gangemi, Weimer; Assistant Professors 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 45 hours beyond Physics 100 in his major field including 2 hours each of 310, 320, 330, 340, and Differential Equations.

The basic curriculum for concentration in physics should be entered upon during the freshman year, and can be obtained from the department chairman.
100. **Physics.** To familiarize the Liberal Arts student with some of the basic laws and principles which govern the behavior of nature and give him the proper perspective and orientation for life in a very highly science-oriented world. The course covers topics in Physics and Astronomy. *One unit.*

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

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

213. **General Physics: Electricity and Magnetism.** *4 hours.* These courses are for pre-medical, pre-dental, pre-pharmacy and secondary education students. (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.* Courses for engineers and physical science majors. (4 + 2) 231 should precede 232 and 233. Prerequisite: Mathematics 153 or 241.

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

302. **Electronics.** Electron ballistics, thermionic emission, vacuum tube and transistor characteristics, rectifiers, amplifiers, oscillators, modulators, demodulators, and electron tube and transistor instruments. (4 + 2). Prerequisite: Calculus 253 and Physics 233. *5 hours.*

303. **Modern Physics.** Introduction to the concepts of relativity, quantum and wave mechanics, atomic structure and absorption and emission processes and nuclear structure. Prerequisites: Mathematics 351 or 341 and Physics 233. *3 hours.*

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

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

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

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

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

402. **Electricity and Magnetism.** Electric and magnetic fields, dielectrics, inductance, capacitance, direct and alternating current circuits. Prerequisites: Physics 233 and Mathematics 351 or 341. *5 hours.*

413. Solid State. A lecture and problems course in the structure of solids and their phenomena. Quantum and statistical mechanics concepts are introduced to develop theories of internal stress and strain in crystals, conductivity of electricity in metals, semiconductors and superconductors, magnetism, the thermal properties of solids and imperfections in solids. Prerequisite: Modern Physics or permission of instructor. 3 hours.

423. Light. The laws of physical and geometric optics; optical instruments, reflection, refraction, absorption, dispersion, interference, and polarization. A study of lenses, prisms, mirrors, gratings, and instruments used in the study of light. Prerequisite: Physics 233. 5 hours.

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

PSYCHOLOGY AND SOCIOLOGY
(Department 133)

Professor Markle; Assistant Professors Crider (Acting Chairman), Cohoe, Gates; Instructor Compton; Lecturer Crider.

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

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

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

In order to complete a field of concentration in the area of Social Welfare, the student must complete the following courses: Biology 100; Political Science 105; Psychology 100, 351, and 433; Sociology 201, 202, 203, 321, 323, 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.

311. Psychology of Personality. The nature and development of personality, and methods of adjustment; discussion of the various theoretical approaches to the psychology of personality. Prerequisite: Psychology 100. 5 hours.

332. Applied Psychology. The application of psychological principles to problems of modern life; clinical practice; personnel work; home life; education; industry; business law and criminology; medicine and social reform. Prerequisite: Psychology 100. 5 hours.

333. Psychology of Learning. The theoretical frames of reference and supporting research which underlie current conceptualizations of behavior modification in terms of the process of learning with an emphasis on conditioning and reinforcement theories. Prerequisite: Psychology 100. 5 hours.

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

351. Social Psychology. Social behavior and social adjustment; the effect of the social environment upon the development of personality; the relation of social and psychological laws to problems of the community. Prerequisite: Psychology 100. 5 hours.

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

411. Counseling and Guidance. The basic psychological principles involved in educational, vocational, and personnel counseling; their application to a sound guidance program. Prerequisite: Psychology 100. 5 hours.

425. 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 including experimental methods, report writing, terminology, and relevant background materials. Prerequisite: Psychology 100 and 350. 5 hours.

432. History and Systems of Psychology. The European antecedents of modern day psychology and its transmission to and development in the United States. Emphasis on the schools—Structuralism, Functionalism, Behaviorism, etc. Prerequisite: Psychology 100. 5 hours.

433. Human Growth and Development. Human development from conception to old age. Emphasis upon the physical, emotional and personality development of the individual. Prerequisite: Psychology 100. 3 hours.

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

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

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

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

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

300. **Population Problems.** The composition of population and its distribution in the territory of the U.S.: fertility, mortality. The problems of mate selection, birth control, standard of living and migrations. Open to Juniors and Seniors only. 5 hours.

301. **Social Pathology.** Social pathology, as it concerns our own society, including the study of such problems as poverty, crime, the family, public health, etc. Prerequisite: Sociology 100. 5 hours.

302. **Physical Anthropology.** Primate and Human anatomy, the evolution of man and fossil man; race, Mendelian and population genetics; man's present and future evolution. 5 hours.

303. **Archaeology and Linguistics.** The methodology of archeological research. Relation of archeology to fossil man and human history. World archeological sequences with emphasis upon North America, with brief introduction to Ohio archeology. Introduction to historical and structural linguistics and their relation to general anthropology. 5 hours.

321. **Criminology.** The problems of crime and criminals; the factors conducive to the making of criminals; a suggested program of treatment and prevention; penal institutions and the history of punishment. Open to Juniors and Seniors only. 5 hours.

323. **Juvenile Delinquency.** Characteristics of delinquents, juvenile court procedures, correctional training in institutions, plans and programs for the prevention of delinquency. Open to Juniors and Seniors only. 5 hours.

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

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

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

343. **Social Work Methods.** 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. **Race Relations.** The phenomena which arise when groups of people who differ racially or culturally come into contact with one another. Prerequisite: Sociology 241. 5 hours.
412. **Theory and Research Methods in Sociology.** The history and growth of sociological theory, procedures and problems of scientific and sociological research. Includes a theory research paper and a practice research project. Prerequisites: Sociology 241, Social Statistics 350, and Senior standing. 5 hours.

413. **Industrial Sociology.** The social organization of industry and human relations in the work plant. Conflict and cooperation in the work group and the relation between the work group and the community. 3 hours.

414. **Rural-Urban Sociology.** A comparative study of the organization, social processes, problems, and interrelationships of rural and urban communities. Prerequisite: Sociology 105. 5 hours.

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

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

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

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

443. **Social Field Work Observation and Orientation.** To enable qualified students to observe and participate in social work programs under the supervision of professional workers. Prerequisite: 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. Prerequisite: Sociology 441, 442. 3 hours.

**SPEECH AND THEATER**

(Department 153)

Assistant Professors Kissell, Watson, Instructors Kneller, Porter.

**Speech Courses**

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

For a major in Speech, the following courses are required: 261, 262, 270 (3-6 hours), 272-273, 371-352, 371, 372, 373, 470. Additional courses must be selected from Speech and Theater offerings to complete 45 hours. Speech 100 does not count toward a major. Speech majors can work toward secondary teaching certification.
100. **Speech.** One unit.

160. **Professional Public Speaking.** Oral communication in the various areas of speech, limited practice in professional public speaking and listening. 1 hour. (For nursing students only. Does not meet the Liberal Arts requirement).

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

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

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

270. **Speech Activities.** Extra-curricular debate and/or individual speech activities, including intercollegiate meets. May be repeated for credit. 1 hour.

272. **Public Speaking II.** Advanced Public Speaking. Application of modern rhetorical theory and criticism to the composition and delivery of original speeches. Emphasis is on clear, orderly presentation of ideas suitable to a particular audience and occasion. Prerequisites: Speech 100 or one unit of high school Speech.

273. **Public Speaking III.** History of Public Address. A critical and historical survey of the development of rhetorical theory and oratory from the Greek period to the present, with emphasis on the orator's role in the development of political and social movements. Prerequisite: Speech 272 or permission of instructor.

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

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

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

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

373. **Advanced Persuasive Speaking.** 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 272 or 273 or 371 or 372.

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

The program in Theater seeks to develop understanding of the function of drama in our society, to foster an appreciation of the aesthetics involved, and to present theater experiences to the university as a whole. The person who majors in Theater Arts is expected to become familiar with and to develop skills in some chosen area. These areas are
divided into two broad categories—Creative Theater (acting, directing, and playwriting) and Technical Theater (costuming, make-up, lighting, and design).

The student in Creative Theater is required to take the following courses: 261, 262, 281, 282, 283, 291, 292, 293, 363, 384, 385, 386, 391, 396, 481, 482, 483, 487, 488, 489. The student is also required to take nine hours of dramatic literature.

The student in Technical Theater is required to take the following courses: Theater 291, 292, 293, 294, 295, 296, 384, 386, 396, 482, 483, 486, 491, 492 (or 495, 496). The student is also required to take nine hours of related arts (drawing and painting, carpentry, electronics, metal work, etc.) and nine hours of dramatic literature.

A student may major in Drama (combination of dramatic literature and theater arts courses). The curriculum will be provided in consultation with the Chairman of the Department and the Director of Theater. For all three areas—Creative Theater, Technical Theater, and Drama—two years of a modern foreign language are required. No course with a grade below "C" may be counted toward the major.

105. THEATER. One unit.

280. THEATER ACTIVITIES. Participation in some aspect of a theatrical production. 30 hours time per quarter is required for 1 credit hour. A maximum of six quarters. 1 hour.

281, 282, 283. ACTING TECHNIQUE. Exercises and improvisational work designed to develop the basic skills of the actor. 9 hours.

292, 293. THEATER HISTORY. Theater from the beginnings to the eighteenth century; theater from the eighteenth century to the present (Prerequisite: 291). 6 hours.

294, 295, 296. STAGECRAFT. Theoretical and practical work in the fundamentals, covering all aspects of theater production. 9 hours.

384. BODY MOVEMENT. To develop the ability to meet physical demands made on the actor and to produce physical freedom. 3 hours.

385, 396. CHILDREN'S THEATER. The entire production of theater for a younger audience; Acting and technical participation in the touring company. 6 hours.

386. DIRECTING. Theory and practice. 3 hours.

391. MAKE-UP. Development of character by actor through use of make-up. 3 hours.

482, 483. WORKSHOP. Scenes developed by student directors and actors in supervised rehearsals (Prerequisite: 281, 282, 283, or 294, 295, 296, and 386). 6 hours.

486. SEMINAR. Seminars and independent projects. 3 hours.

487, 488, 489. SCENE STUDY. Student-rehearsed scenes presented for critique. (Prerequisite: 281, 282, 283). 9 hours.

491, 492. TECHNICAL THEATER I. Costume and make-up instruction and practice. 6 hours.

495, 496. TECHNICAL THEATER II. Lighting and design, instruction and practice. 6 hours.
Student runs Weir test in engineering college hydraulics lab.
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-seven years of its existence the College of Engineering has had more than twenty-seven 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, English, reading, and/or physics, will be required to make up the deficiency. This will take at least one summer session in addition to the regular four-year program or may require a fifth year.

B. **Transfer Students.** Students from other accredited colleges and universities 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 and the payment of the extra hour fee. Engineering students are responsible to fulfill the requirements of the current year’s catalog as they apply to that year of his course.

STUDENT'S ACADEMIC STATUS

Good Standing is the status when no academic conditions exist, i.e., the previous quarter’s grade point average was at least 2.0 (“C” average) and the accumulative average is at least 2.0.

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

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

Students on warning are required to have at least semi-monthly consultations with their adviser; students on probation, at least weekly.

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. First year students on the five-year program are RANK 15; second, 25; third, 35; fourth 45; and fifth, 55. For the four year students the RANKS are 24, 34, 44, and 54 respectively. The first digit indicates the LEVEL at which the student is studying and the second digit shows the length of the program, i.e., a four-year or a five-year program.

Courses, 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 is required for graduation. The student must have a scholarship rating of at least two quality points for each credit hour scheduled with an accumulative point average of 2.0 in all engineering courses. A student is not permitted to be a candidate for more than one degree at any one time, the Arts-Engineering program excepted.

All degree candidates must spend their last year in residence, taking at least forty-five quarter hours in the 500 level engineering courses for final credit toward graduation.

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

REGISTRATION AS A PROFESSIONAL ENGINEER

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

ENGINEERING BUILDING

The College of Engineering, staff, and faculty are housed in a three story, thirty-eight room brick structure. The building has drafting rooms, design rooms, classrooms and laboratories, including Testing Materials Laboratory, Fluid Mechanics Laboratory, Concrete Laboratory, Soils Laboratory, Steam Laboratory, Thermodynamics Laboratory, Instrumentation Laboratory, Surveying Supply, Senior Design Room, Machine Shop, Power Laboratory, Electronics Laboratory, Control Laboratory, Analog Computer Laboratory, and Computer Center.

COMPUTER CENTER

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

ORGANIZATIONS
PROFESSIONAL AND TECHNICAL

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

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

All civil engineering students are eligible for membership in the Ohio
Northern Student Chapter of the American Society of Civil Engineering
(ASCE); activities of A.S.C.E. round-out the student’s program. It is affili-
ated with the Toledo Section of the American Society of Civil Engineers.

The Institute of Electrical and Electronics Engineers (IEEE) Student
Branch is the technical society of electrical engineers. Topics pertinent to
the field of electrical engineering are presented and discussed at their meet-
ings. The student chapter enjoys a very close association with the Lima Sec-
tion of the Institute of Electrical and Electronics Engineers.

The Ohio Northern Student Section of the American Society of Me-
chanical Engineers (ASME) is the technical society that sponsors the dis-
cussion of mechanical engineering and its allied fields. It is affiliated with
the Toledo Section of the American Society of Mechanical Engineers.
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.

BASIC ENGINEERING

Instructor 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 Beginning Four-Year Students)
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 on the four-year program 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.


110. Engineering Reports (1+0). Basic elements of report writing from the standpoint of the engineer. Format for technical reports. Teaching-aids laboratory reports turned into technical reports with carry-over value. 1 hour.

111-112. Engineering Graphics 1 & 2 (0+4). Lettering, use of instruments, applied geometry, orthographic projection, sketching, pictorial sketching, dimensioning; advanced orthographic projection, descriptive geometry; point, line, plane problems, curved surfaces, developments, intersections, perspective. 4 hours. (Formerly 201-2).

NOTE: (2+1) indicates the student contact hours per week. The first number gives the lecture hours while the second, shows the laboratory hours.
## ARTS-ENGINEERING PROGRAM

### FIRST YEAR

#### FIRST LEVEL (Rank 61)

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>*English</td>
<td>112100  - 112101 - 112102</td>
<td>3 3 4</td>
<td>3 3 4</td>
</tr>
<tr>
<td>*Chemistry</td>
<td>122131  - 122132 - 122143</td>
<td>5 0 5</td>
<td>5 0 5</td>
</tr>
<tr>
<td>*Mathematics</td>
<td>123241  - 123242 - 123243</td>
<td>3 2 4</td>
<td>3 2 4</td>
</tr>
<tr>
<td>Language 2 (Second Year)</td>
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<td>3 0 3</td>
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<td>Social Science Elective</td>
<td></td>
<td>1 0 1</td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td>201120</td>
<td>0 2 1</td>
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<tr>
<td>Physical Education</td>
<td>143001, 143002, 143003</td>
<td>15 7 18</td>
<td>14 7 17</td>
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</table>

#### SECOND YEAR

#### SECOND LEVEL (Rank 62)

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
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<th>Spring</th>
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<tbody>
<tr>
<td>*Mathematics</td>
<td>123341  - 123352 - 123353</td>
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<td>5 0 5</td>
</tr>
<tr>
<td>*Physics</td>
<td>124231  - 124232 - 124233</td>
<td>4 2 5</td>
<td>4 2 5</td>
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<tr>
<td>Fine Arts</td>
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<td>3 0 3</td>
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<tr>
<td>*Liberal Arts Major</td>
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<td>5 0 5</td>
<td>5 0 5</td>
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<tr>
<td>*Digital Computer 1, 2, Engr. Reports</td>
<td>101101  - 201102 - 201110</td>
<td>2 1 2</td>
<td>1 1 2</td>
</tr>
</tbody>
</table>

### 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 page 56 for definition of Unit Course.
### Third Year

<table>
<thead>
<tr>
<th>Philosophy, Religion, Unit Elective</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>115100, 115105, ...</td>
<td>R</td>
<td>L</td>
<td>C</td>
</tr>
<tr>
<td>Humanities Elective</td>
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<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Arts Major</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Graphics 1, 2, Thermo. 1</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Mechanics 1, 2, 3</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Passive &amp; Active Circuits 1, 2, 3</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Intro. To Engr. Lab, Circuits Lab 1, 2</td>
<td>1</td>
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<td>1</td>
</tr>
</tbody>
</table>

| Total Units: 13 4 15 | Total Units: 12 7 15 | Total Units: 15 3 16 |

### Fourth Year

<table>
<thead>
<tr>
<th>400 Level Engineering Courses Depending on Department plus L. A. Major</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 0 3</td>
<td>R</td>
<td>L</td>
<td>C</td>
</tr>
<tr>
<td>5 0 5</td>
<td>5</td>
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<td>5</td>
</tr>
</tbody>
</table>

### Fifth Year

<table>
<thead>
<tr>
<th>500 Level Engineering Courses Depending on Department plus L. A. Major</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 0 3</td>
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</table>

* Course sequences which must be completed in order to advance to the next rank classification.
### Basic Four Year Engineering Program

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>L</td>
<td>C</td>
</tr>
<tr>
<td><strong>First Year</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Second Level (Rank 24)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><em>English</em></td>
<td>112100</td>
<td>112101</td>
<td>112102</td>
</tr>
<tr>
<td><em>Mathematics</em></td>
<td>123241</td>
<td>123242</td>
<td>123243</td>
</tr>
<tr>
<td><em>Orientation</em></td>
<td>201110</td>
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<td></td>
</tr>
<tr>
<td><em>Engineering Reports, Physics 1, 3</em></td>
<td>201110</td>
<td>124231</td>
<td>124233</td>
</tr>
<tr>
<td><em>Digital Computer 1, 2</em></td>
<td>201101</td>
<td>201102</td>
<td></td>
</tr>
<tr>
<td><em>Engineering Graphics 1, 2</em></td>
<td>201111</td>
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<tr>
<td>Social Science Elective</td>
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<td>Physical Education</td>
<td>143001</td>
<td>143002</td>
<td>143003</td>
</tr>
<tr>
<td></td>
<td>12</td>
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</tr>
<tr>
<td></td>
<td>+1 Unit</td>
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<tr>
<td><strong>Second Year</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Third Level (Rank 34)</strong></td>
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</tr>
<tr>
<td><em>Physics, Chemistry</em></td>
<td>124232</td>
<td>122100</td>
<td>122131</td>
</tr>
<tr>
<td><em>Mathematics</em>**</td>
<td>123341</td>
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<td>123353</td>
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<tr>
<td><em>Engineering Mechanics 1, 2, 3</em></td>
<td>201311</td>
<td>201312</td>
<td>201313</td>
</tr>
<tr>
<td><em>Passive &amp; Active Circuits 1, 2, 3</em></td>
<td>201321</td>
<td>201322</td>
<td>201323</td>
</tr>
<tr>
<td><em>Intro. To Engr. Lab, Circuits Lab 1, 2</em></td>
<td>201331</td>
<td>201332</td>
<td>201333</td>
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<tr>
<td>Speech, <em>Thermodynamics 1</em></td>
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<td>201343</td>
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</table>

|                      |   |   |   |   |   |   |   |   |   |
|                       | 16 | 2 | 17 |   | 11 | 3 | 12 |   | 17 | 6 | 19 |
|                       | + 2 Units |   |   |   |   |   |   |   |   |

**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 numbers followed by a comma indicate no dependence.*
- **See page 56 for definition of Unit Course.**
- **Suitable substitutes in statistics and/or probability may be allowed.**
## BASIC FIVE YEAR ENGINEERING PROGRAM

### FIRST YEAR

**FIRST LEVEL** (Rank 15)

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chemistry, Engr. Reports</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Mathematics</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Orientation, Engineering Graphics 1, 2</em></td>
<td>201120 , 201111 - 201112</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Elective</td>
<td></td>
<td></td>
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<tr>
<td>Physical Education</td>
<td>143001 , 143002 , 143003</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>L</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>112100 - 112101 - 112102</td>
<td>Unit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>112100 - 122131 - 201110</td>
<td>Unit</td>
<td>3 3 4</td>
</tr>
<tr>
<td></td>
<td>123151 - 123152 - 123153</td>
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<tr>
<td></td>
<td>201120 , 201111 - 201112</td>
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<td>0 4 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 0 3</td>
<td>3 0 3</td>
</tr>
</tbody>
</table>
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. (Formerly 001).

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 243-52, Physics 231. 3 hours. (Formerly 211).

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. (Formerly 212).

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. (Formerly 213).

321. **Passive and Active Circuits 1** (3+0). Introductory concepts in circuit analysis. Solution of resistive circuits using Ohm's and Kirchhoff's Laws, mesh and nodal analysis, and network theorems. Prerequisite: Physics 233, Math 341-51 or concurrently. 3 hours. (Formerly 221).

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. (Formerly 222).

323. **Passive and Active Circuits 3** (3+0). Magnetically coupled circuits, introduction to network topology, polyphase circuits and Fourier analysis. Prerequisite: 322. 3 hours. (Formerly 223).

331. **Introduction to Engineering Laboratory** (1+0). A rational approach to the planning, operation and interpretation of experiments; propagation of errors in instrument systems; dimensional analysis; sequence and spacing of runs; analysis, rejection criteria and reduction of data. Prerequisite: Math 243-52, Physics 233. 1 hour. (Formerly 231).

332-333. **Circuits Laboratory 1 & 2** (0+3). A laboratory study of electric circuits. Prerequisite: 322 concurrently, 331. 2 hours. (Formerly 232-3).

421. Thermodynamics 2 (3+0). Relations among thermodynamic properties, mixtures, chemical reactions and equilibrium. 
Prerequisite: 343. 3 hours. (Formerly 321).

422. Fluid Mechanics (3+0). Basic principles based on the fundamentals of mechanics and properties of fluids, the basic equations and behavior of fluids in conduits, and flow around submerged objects.
Prerequisite: 312. 3 hours. (Formerly 322).

CIVIL ENGINEERING DEPARTMENT

PROFESSORS KEYSER; ASSOCIATE PROFESSORS ANDERSON, KOEHN, MILKS (CHAIRMAN); ASSISTANT PROFESSOR ATORS

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, well-equipped laboratories, a large modern design room, and a scientific library. Laboratory work is offered in testing materials, concrete, soil mechanics and fluid mechanics, as well as field work in surveying.

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.

401. Mechanics of Materials (3+0). Deflection, combined loadings, repeated loading, dynamic loading, connections, formulation of statically indeterminate problems.
Prerequisite: 201313. 3 hours. (Formerly 301).

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. (Formerly 311).

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. (Formerly 312).
FOUR YEAR PROGRAM—CIVIL ENGINEERING
(See Page 128 For First and Second Year and Notation)

THIRD YEAR

FOURTH LEVEL (Rank 44)

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
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FOURTH YEAR

FIFTH LEVEL (Rank 54)

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| Total                              | 17 3 18 | 16 3 17 | 18 0 18  |

*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.
413. Structural Analysis 3 (4+0). Fundamentals of statically indeterminate structures; classical and approximate methods of solution. Prerequisite: 412. 4 hours. (Formerly 312).

423. Hydraulics (3+0). Flow in closed conduits and open channels; determination of runoff; flow measurements; development of water resources; and design of hydraulic structures. Prerequisite: 201422. 3 hours. (Formerly 323).

431. Transportation (3+3). Principles of transportation systems; economics, finance, and planning; and design, construction, and maintenance. Prerequisite: Permission of instructor. 4 hours. (Formerly 333).

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.

443. Civil Engineering Laboratory. (1+6). Experimental verification of fundamental concepts of mechanics of materials and fluid mechanics. Prerequisite: 201422, 401. 3 hours. (Formerly 341-2).

452. Materials Science (3+0). Fundamentals of physical and chemical properties of engineering materials. Prerequisite: Chemistry 131, Physics 233. 3 hours. (Formerly 352).

453. Engineering 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 131. 4 hours. (Formerly 355).

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 131, 423. 3 hours. (Formerly 411).

512. 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. (Formerly 412).

513. Construction Methods (2+3). Specifications, economical construction methods, quantity take-offs, cost analysis, and cost estimating as applied to various engineering projects. Prerequisite: 521, 541. 3 hours. (Formerly 413).

521. Reinforced Concrete 1 (4+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. 4 hours. (Formerly 421).

522. Reinforced Concrete 2 (4+0). Retaining walls, footings, two-way and flat slabs, and thin shell roofs. Design of concrete buildings and bridges. Prerequisite: 521. 4 hours. (Formerly 421).
523. Prestressed Concrete (3+0). The principles of prestressing, general equation for flexural design, pretension and post-tension, losses in prestress, shear, and diagonal tension, and deflections. Design of prestressed concrete members. Prerequisite: 522. 3 hours. (Formerly 423).

531. Soil Mechanics (3+3). An introduction to soils engineering, physical properties of soils as affecting engineering design and construction, soil sampling, mechanics of soil masses, consolidation, settlement, and laboratory soil tests. Prerequisites: 423, 455. 4 hours. (Formerly 451).

532. Foundation Engineering (3+3). Analysis of stress conditions imposed on the supporting soils by foundations. Design of foundations, retaining structures, and piles. Prerequisite: 531. 4 hours. (Formerly 432).

533. Engineering Law (3+0). Legal principles of vital interest to engineers. General nature of law and the working of the judicial system. Contracts, agencies, sales, negotiable instruments, workmen's compensation, mechanics liens, property, patents, and expert testimony. Prerequisite: Fifth Level. 3 hours. (Formerly 433).

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. (Formerly 441).

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. (Formerly 442).

543. Advanced Structural Mechanics (3+0). Theory of elasticity, structural stability, plates and shells, and vibrations. Prerequisite: 542. 3 hours. (Formerly 443).

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. (Formerly 490).

**Electrical Engineering Department**

Professor Klingenberg (Chairman); Associate Professor Carmean; Assistant Professors Johansen, Guentzler, Stahl.
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 341-51. 4 hours. (Formerly 301).

411. Electronics 1 (3+0). Operating principles of electronic devices; models representing these devices. Prerequisite: 201323. 3 hours. (Formerly 311).

412. Electronics 2 (3+0). Small signal amplifiers; feedback; audio-frequency and radio-frequency amplifiers with large signals. Prerequisite: 411. 3 hours. (Formerly 312).

413. Electronics 3 (3+0). Oscillators; AM-FM-PM modulation and demodulations. Prerequisite: 412. 3 hours. (Formerly 313).

431-432. Fields and Waves 1 & 2 (4+1). Electrical phenomena from the viewpoint of field theory. Vector analysis used throughout. Prerequisite: 201323, Math 341-51. 8 hours. (Formerly 331-2).

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. (Formerly 333).
FOUR YEAR PROGRAM—ELECTRICAL ENGINEERING
(See Page 128 For First and Second Year and Notation)

THIRD YEAR

FOURTH LEVEL (Rank 44)

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FOURTH YEAR

FIFTH LEVEL (Rank 54)

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+ 1 Unit

*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. (Formerly 342).

443. **Control Systems 1** (3+0). Closed-loop systems performance from equations and transfer-function plots. Prerequisite: 442. 3 hours. (Formerly 343).

451-452. **Electrical Engineering Laboratory 1 & 2** (0+3). Study of active devices and their associated circuits. Prerequisite: 411 concurrently. 2 hours. (Formerly 351-2).

453. **Electrical Engineering Laboratory 3** (0+3). Continuation of 452 and introduction to microwave generators, detectors, waveguides, waveguide components, and microwave measurements. Prerequisite: 415 and 433 concurrently. 1 hour. (Formerly 353).

463. **Analog Computer Laboratory** (0+3). Introduction to analog computer programming. Prerequisite: 442. 1 hour. (Formerly 363).

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

512. **Electronics 5** (3+0). Electronics power conversion circuits and devices. Power control and regulator circuits; power supply filters. Prerequisite: 511. 3 hours. (Formerly 412).

521. **Circuit Synthesis** (3+0). Introduction to the principles of modern circuit synthesis. Prerequisite: 442. 3 hours. (Formerly 421).

522. **Nonlinear Analysis** (3+0). Analysis of physical systems containing non-linear elements. Analytical, graphical, and numerical methods are studied. Prerequisite: 541. 3 hours. (Formerly 422).

523. **Communication Theory** (3+0). An introduction to the principles of communication theory. Prerequisite: 412, 442. 3 hours. (Formerly 423).

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. (Formerly 432).

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. (Formerly 432).

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. (Formerly 433).
541. **Control Systems 2 (3+0).** Control system design using root locus and frequency response methods.  
Prerequisite: 443. 3 hours. (Formerly 441).

551. **Electrical Engineering Laboratory 4 (0+3).** Continuation of 453 and electronic wave shaping and switching circuits.  
Prerequisite: 453, 511 concurrently. 1 hour. (Formerly 451).

552. **Electrical Engineering Laboratory 6 (0+3).** Continuation of 551 and power electronics application.  
Prerequisite: 551, 512 concurrently. 1 hour. (Formerly 452).

553. **Electrical Engineering Laboratory 8 (0+3).** Laboratory study of nonlinear systems utilizing analog and digital computer techniques.  
Prerequisite: 522 concurrently. 1 hour. (Formerly 453).

561. **Electrical Engineering Laboratory 5 (0+3).** Laboratory study of automatic control systems.  
Prerequisite: 453, 463, 541 concurrently. 1 hour. (Formerly 461).

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. (Formerly 462).

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. (Formerly 463).

590. **Special Projects.** The independent planning and conduct of an engineering design or development project; or, individual study of a topic of particular interest to the student; or, group study of selected topics of current interest; or, a series of discussions with practicing engineers pertaining to design problems under their direction.  
Prerequisite: Departmental permission. 1-3 hours. (Formerly 490).

**MECHANICAL ENGINEERING DEPARTMENT**

**Professors Glass, Horlde; Associate Professor Burton (Chairman); Assistant Professors Farrington, Whisler.**

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

The mechanical engineer today is faced with such vital problems as space flight, automation, ever greater demands on the use of existing materials and mechanisms in missiles, automotive, electronic, and other fields, and the design of equipment necessary to produce them.

Every mechanical engineering student has the opportunity to use extensively the engineering analysis and design laboratories as well as the Computer Center. The laboratories
are equipped to supplement all engineering courses. They provide instructions, procedures, and techniques for the individual as well as group projects and limited undergraduate research.

Student explains oscilloscope during engineering open house.
# FOUR YEAR PROGRAM—MECHANICAL ENGINEERING

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

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<th>Winter</th>
<th>Spring</th>
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*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)

Prerequisite: Chemistry 131, Physics 233. 2 hours. (Formerly 311)

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; gaging and inspection; their programming for numerical and tape control of automation type mass-production equipment.
Prerequisite: 411. 2 hours. (Formerly 312)

413. Introduction to Design (0+4). An introductory course covering the specialized aspects to, and preparatory for, mechanical design. The main object is the use and application of metallurgical and manufacturing processes. All drawings are executed according to existing commercial and industrial standards.
Prerequisite: 412. 2 hours. (Formerly 313)

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. (Formerly 323)

431-432-433. Mechanical Engineering Laboratory 1, 2, & 3 (0+6). Fundamental mechanical laboratory sequence: specific experiments involving measurements, instrumentation, calibration, and analysis of experimental accuracies. Concurrent small-team investigative projects of timely interest.
Prerequisite: Fourth Level. 6 hours. (Formerly 331-2-3)

441. Kinematics (3+3). Mechanisms and their motion: acceleration, velocity, and displacement of machine elements (gears, cams, etc).
Prerequisite: 201312. 4 hours. (Formerly 341)

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. (Formerly 342)

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: Math 353, 201422. 3 hours. (Formerly 343)

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: 413. 3 hours. (Formerly 402).

511-512. MECHANICAL DESIGN 1 & 2 (3+3). Sequence of design of machine elements: analytical study of shafts, bearings, gears, fasteners, clutches, couplings, etc., and preparation and execution of drawings according to professional standards.
Prerequisites: 202401, 413, 441. 8 hours. (Formerly 411-2).

513. MECHANICAL DESIGN 3 (3+3). Machine design: complete design and layout of a machine or unit as used in a particular branch of mechanical engineering including in the design the previously studied elements and mechanisms, in order to develop engineering judgment and professional proficiency from the original conception of an idea to the finished product.
Prerequisite: 512. 4 hours. (Formerly 413).

521. NUMERICAL ANALYSIS (3+0). Application of numerical methods to the solution of engineering problems.
Prerequisite: Math 353. 3 hours. (Formerly 421).

522-523. THERMAL SYSTEM ANALYSIS 1 & 2 (2+0 & 4+0). Integration of the fundamental (and repetitive) thermal aspects of the traditional fields of internal combustion engines, steam power stations, environmental control and turbomachines with emphasis on the system analysis approach and simulation techniques.
Prerequisite: 203423, 442, 443. 6 hours. (Formerly 422-3).

531-532-533. MECHANICAL ENGINEERING LABORATORY 4, 5, & 6 (0+6). Applied mechanical laboratory sequence: specific performance tests of engines, fluid handling devices, environmental condition-apparatus, etc. Concurrent investigative projects of individual interest and nature. Stresses development of the art of communication in reporting laboratory work.
Prerequisite: 433. 6 hours. (Formerly 431-2-3).

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. (Formerly 441).

542. ADVANCED DYNAMICS (3+0). Special topics in the area of mechanical vibrations and advanced dynamics.
Prerequisites: 201312, 203442. 3 hours. (Formerly 442).

543. ADVANCED ENGINEERING MECHANICS (3+0). Methods of structural mechanics with applications to curved flexural members, thick-walled cylinders, contact stresses, stress concentration, and other selected topics in stress analysis.
Prerequisite: 202401. 3 hours. (Formerly 443).

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. (Formerly 490).
college of pharmacy
Pharmacy student with $1,000 grant carries out research.

Pharmacy students learn diagnostic methods during seminar.
College Of Pharmacy

DR. LEROY D. BELTZ, DEAN.

In the spring of 1884 the Ohio Legislature passed its first law to regulate the practice of pharmacy. The law stated that, "the Ohio Board of Pharmacy should examine every person who desired to carry on the business of a retail apothecary, or retailing drugs, medicines, chemicals, poisons, or compounding and dispensing the prescriptions of physicians, testing his competency for that purpose."

This act and its purpose caught the educational interest of Henry S. Lehr, then president of Northwestern Ohio Normal School. He reasoned that if pharmacists were to be examined for their competency as practitioners they would seek schooling in certain subjects. And he made it known that the Department of Pharmacy would offer courses for those interested in preparing themselves for careers in pharmacy.

The demands of those students wishing to study pharmacy so impressed the faculty that pharmacy was soon established as a distinct course. At first the course was very simple but in 1886 it was enlarged and extended to 40 weeks. From that date to the present the curriculum and facilities have been changed and improved to meet the educational demands of the practice of pharmacy in Ohio and elsewhere.

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 pass 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. Reference library facilities are available in the Pharmacy Continuation Studies Center.
REQUIREMENTS FOR ADMISSION TO PRE-PROFESSIONAL EDUCATION

Students entering the pre-professional pharmacy program should have four years of English; two and one-half years of mathematics (algebra and plain geometry, algebra II and/or trigonometry), 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 Liberal Arts entrance requirements.

Further information may be obtained from the College of Pharmacy.

REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF PHARMACY

1. To enter the College of Pharmacy an applicant must furnish to the 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 Program 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 warning, (2) being placed on probation, (3) being suspended from the College of Pharmacy, or (4) being dismissed from the College of Pharmacy.
If a student’s quality point average for any quarter falls below 2.0, the student will be placed on warning.

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

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

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**

**PREPHARMACY**

<table>
<thead>
<tr>
<th>First Year (P-1)</th>
<th>Winter</th>
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<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>English 100</td>
<td>Unit*</td>
<td>English 102</td>
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<tr>
<td>Mathematics 151</td>
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<td>Mathematics 192</td>
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<td>Chemistry 131</td>
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<td>Biology 100</td>
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<th>Second Year (P-2)</th>
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<td>Physics 212</td>
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<td>Chemistry 231</td>
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<tr>
<td>Economics 100</td>
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<td>Philosophy 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

THIRD YEAR (P-3)

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<th>Fall</th>
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<tr>
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<td>Pharmacy 312</td>
<td>Pharmacy 333</td>
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<tr>
<td>Inorganic Med. Chem. 351</td>
<td>Pharm. Anal. 352</td>
<td>Microbiology 361</td>
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<tr>
<td>Pharm. Acct. 231</td>
<td>Pharm. Manag. Acct. 232</td>
<td>Introduction to Instruments 353</td>
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FOURTH YEAR (P-4)

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FIFTH YEAR (P-5)

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<td>Pharmacy Law 551</td>
<td>Pharm. Marketing 553</td>
<td>Pharm. Manag. 552</td>
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<td>Public Health 502</td>
<td>Pharmacy Seminar 540</td>
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Students must accumulate 31 elective hours (or its equivalent) in addition to the above listed required hours to meet the graduation requirement of 250 total hours.

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 parentheses 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 PROFESSOR THEODORE (CHAIRMAN), ASSISTANT PROFESSOR VOTTERO, PROFESSORIAL LECTURER FRAZIER.

101 and 102. PHARMACY ORIENTATION (1+0). The educational and legal requirements of pharmacy, its organizations, and the areas of service available to those who are properly qualified. 2 hours.

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: Pharmacy 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.

420.* Inorganic Pharmaceuticals (2+3). Manufacture of the more difficult medicinal products; library assignments and reports. Prerequisite: Consent of instructor. 3 hours.

421. Hospital Pharmacy (2+0). The administrative and professional principles and concepts of the practice of pharmacy in hospitals. 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 prescription; the receiving, filling, handling involved in all compounding techniques and procedures. Includes a discussion of chemical, physical, and therapeutic incompatibilities. 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). Current problems of pharmacy; factual analyses, panel discussions. The current literature of pharmacy will be reviewed. 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 Hospital Pharmacy (1+3 hours). The functions, systems and responsibilities of hospital practices; policies, procedures and the application of principles to the practice of pharmacy in hospitals. 1-3 hours.
DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

(DEPARTMENT 302)

PROFESSORS 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 132 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. Prerequisite: Chemistry 143 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.

462. CHEMISTRY OF ORGANIC MEDICINAL SUBSTANCES (3+0). A continuation of Pharmaceutical Chemistry 461. Prerequisite: Pharmaceutical Chemistry 461. 3 hours.

463. CHEMISTRY OF ORGANIC MEDICINAL SUBSTANCES (3+0). A continuation of Pharmaceutical Chemistry 462. Prerequisite: Pharmaceutical Chemistry 462. 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).

133. PHARMACOLOGY (3+0). An introductory course, designed for students of nursing, on the principles of pharmacology, pharmacodynamics, and pharmacotherapeutics. Spring quarter. Prerequisite: Biology 232. 3 hours.
431. Pharmacology and Toxicology 1 (5+3). Principles of pharmacology and toxicology and pharmacodynamics, pharmacotherapeutics, and toxicology of agents affecting the autonomic and central nervous systems. Fall quarter. Prerequisites: Biology 333 and Pharmaceutical Chemistry 342. 6 hours.

432. Pharmacology and Toxicology 2 (4+3). Pharmacodynamics, pharmacotherapeutics, and toxicology of agents affecting the cardiovascular system, the blood, the hematopoietic system, the reproductive system, water and mineral balance, and metabolism. Winter quarter. Prerequisite: Pharmacology 431. 5 hours.

433. Pharmacology and Toxicology 3 (4+3). Pharmacodynamics, pharmacotherapeutics, and toxicology of locally acting agents, chemotherapeutic agents, and antibiotics and special toxicology. 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, tanning, proteins, enzymes, vitamins and volatile oils. Prerequisites: Pharmacognosy 421, Biochemistry 322, Microbiology 361. 4 hours.

423. Pharmacognosy (3+3). A continuation of Pharmacognosy 422, covering lipids 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. 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. 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. Prerequisite: Departmental approval. 3 hours.
549. *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.* Pharmacognosy Problems (0+3, 0+6, 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 PHARMACY ADMINISTRATION**
(Department 305)

231. Pharmacy Accounting (3+0). Accounting applied to the modern pharmaceutical economic system. 3 hours.

232. Pharmacy Managerial Accounting (3+0). The accounting-management relationship as applied to contemporary pharmaceutical concerns. 3 hours.

551. Pharmacy Law (4+0). Law and ethics as applied to federal, state and local acts, regulations and practices encountered in the course of professional duties. Liabilities of pharmacists in decisions and actions involving sale of medicinals, poisons, and narcotics. 4 hours.

552. Pharmaceutical Marketing (3+0). Modern methods of merchandising, agencies involved in marketing drug products and their functions, particularly as they affect the retail phase of professional practice. 3 hours.

553. Pharmacy Management (4+0). Practical solutions to problems encountered in the selection, location, and management of pharmacies, their personnel, stock, and equipment. 4 hours.

**DEPARTMENT OF MICROBIOLOGY**
(Department 306)

Associate Professor Mallin (Chairman).

103. Medical Microbiology (3+2). General and medical microbiology. Infectious diseases, diagnosis, and treatment. Enrollment limited to students of nursing. Prerequisite: Elementary Biology and Chemistry. 4 hours.

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 helminthic 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 urinalysis 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). Prerequisite: Microbiology 361, 362, Toxicology, Statistics. 3 hours.

550.* MICROBIOLOGY PROBLEMS. 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
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 references and a satisfactory score on the Law Aptitude Test (LSAT).

Inquires concerning eligibility for admission and requests for the Law School catalog should be directed to the Dean of the College of Law.

Nicholas Katzenbach (right) in law convocation academic procession.
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ELECTED BY THE OHIO CONFERENCE

Term expires 1968
PAUL J. ACKER, A.B., B.D., D.D., St. Paul's Methodist Church, Defiance, Ohio
MORGAN WILLIAMS, J.D., Attorney, 128 Tibet Road, Columbus, Ohio
GORDON E. HUGHES, B.A., Director of Personnel, Armco Steel Corp., Middletown, Ohio

Term expires 1969
DON MONTGOMERY, A.B., LL.B., President and General Manager, The Celina Insurance Group, Celina, Ohio
PAUL M. VANDEGRiff, A.B., B.D., M.A., D.D., Pastor, Monroe Street Methodist Church, Toledo, Ohio
F. MICHAEL HERREL, B.S., General Manager, Diamond Milk Products, 2511 Bryden Road, Columbus, Ohio

Term expires 1970
CHARLES B. HEDRICK, A.B., M.B.A., 8130 Kugler Mill Road, Cincinnati, Ohio
N. C. McPHERSON, B.Ph., B.D., Ph.D., D.D., Grace Methodist Church, Dayton, Ohio
WALTER L. WHITE, A.B., J.D., Attorney at Law, State Representative, 202 Dominion Building, Lima, Ohio

Term expires 1971
WALTER ENGLISH, B.S., LL.D., The Walter English Co., Columbus, Ohio
FRANK W. WILEY, LL.B., Judge, Common Pleas Court, Toledo, Ohio
ROY C. EBERHARD, A.B., M.B.A., President, Rike-Kumler Co., Dayton, Ohio

Term expires 1972
S. LEE WHITEMAN, A.B., M.A., S.T.B., D.D., LL.D., Administrative Assistant to the Bishop, Ohio West Area, The Methodist Church, 395 E. Broad St., Columbus, Ohio
FLOYD POWELL, A.B., B.D., Pastor, First Methodist Church, Marietta, Ohio

JOHN WESLEY SEAY, B.S., S.T.B., D.D., First Methodist Church, Athens, Ohio.

ELECTED BY THE NORTHEAST OHIO CONFERENCE

Term expires 1968
CHARLES B. MILLER, A.B., Automatic Sprinkler Corp., Youngstown, Ohio

Term expires 1969
HOWARD J. WIANT, A.B., S.T.B., D.D., Norwalk District Superintendent, The Methodist Church, Norwalk, Ohio

Term expires 1970
J. MAURICE STRUCHEN, B.B.A., M.B.A., Senior V.P., National City Bank of Cleveland, Cleveland, Ohio

Term expires 1971
C. RAYMOND COUTS, A.B., LL.B., LL.M., Counsel and Assistant Secretary, B.F. Goodrich Company, 500 South Main Street, Akron, Ohio

Term expires 1972
MRS. G. ROBERT KLEIN, B.A., 23699 Shaker Boulevard, Cleveland, Ohio

ELECTED BY THE ALUMNI

Term expires 1968
GEORGE C. HINDALL, A.B., M.B.A., Hindall and Sons, Ada, Ohio

THOMAS L. K. SMULL, A.B., A.E.D., National Aeronautics and Space Administration, Washington, D.C.

Term expires 1969
ERWIN L. CLEMENS, J.D., member of Law Firm of Shaw, Clemens, Williams & Hines, 203 First Federal Savings Building, Defiance, Ohio

MERRILL J. INSLEY, B.S.Ph., Insley Drug Store, Bellefontaine, Ohio
Term expires 1970
HERBERT W. LEICY, Ph.C., B.S. in Pharm., President, Leicy's Inc., 1531 W. Market St., Steubenville, Ohio
HUGH A. STALEY, J.D., Attorney, 210 Weaver Building, Greenville, Ohio

Term expires 1971
EARL F. BOYLE, B.S.C.E., D.Engr., Ada, Ohio
W. McNEIL KENNEDY, J.D., Attorney, 69 Washington St., Chicago, Ill.

Term expires 1972
ROBERT W. BIGGS, B.S.C.E., President, The Brush Beryllium Co., Cleveland, Ohio
JAMES K. FULKS, B.S.E.E., President, Colonial Broach and Machine Co., 21601 Hoover Road, Warren, Michigan

ELECTED AT LARGE

Term expires 1969
FRANCIS E. KEARNS, A.B., S.T.B., Ph.D., D.D., LL.D., L.H.D., Bishop of the Ohio East Area of the Methodist Church, 1226 Market Avenue North, Canton, Ohio
HAROLD J. MEREDITH, J.D., Attorney, Savings Building, Lima, Ohio

Term expires 1970

Term expires 1971
HAROLD H. EIBLING, B.S.Ed., M.A., Ph.D., D.Sc.Ed., Superintendent of the City Schools, 270 E. State St., Columbus, Ohio

Term expires 1972
JOHN M. TITTLE, B.S., Stein, Roe and Farnham, Chicago, Illinois
WELDON W. CASE, President, Mid-Continent Telephone Corp., Hudson, Ohio
TRUSTEES EMERITI

JAMES J. PILLIOD, B.S.E.E., D. Engr.
89 Greenacres Avenue
Scarsdale, New York

J. BOYD DAVIS, B.S., M.S., D.B.A.
700 Bryden Road
Columbus, Ohio

1093 Sunset Drive
Gallipolis, Ohio

LIFE TRUSTEES

J. V. MELICK, D.B.A.,
Toledo, Ohio

FRANK BRINGLE McINTOSH, A.B., S.T.B., D.D., LL.D., L.H.D.,
D.Sc.Ed.
Port Jervis, New York

THE FACULTY
AND ADMINISTRATIVE OFFICERS

Position and rank as of the 1967-68 academic year.
The year refers to the time of initial service to the University.

ERNESTS ABELE, M. Math. Sc. (University of Latvia) 1952, Chairman,
Department of Physics, Professor of Physics

DONALD R. ANDERSON, B.S.C.E., (Miami, Fla.), M.S.C.E. (Purdue),
1968, Associate Professor of Civil Engineering

GASTON ANIDO-MEULENER, B.A. (Santa Clara), LL.D., Ph.D.
(Havana), 1967, Assistant Professor of Spanish

LAWRENCE H. ARCHER, B.S.C.E., B.S.Ed. (Ohio Northern), M.A.
(Bowling Green), (Ohio State), P.E. (Ohio), 1945, Dean, College of En-
gineering, Professor of Civil Engineering

RICHARD L. ARTHUR, B.S.Ed., M.A. (Bowling Green), 1966, Instructor
in English
SANDRA POUND ARTHUR, B.S.Ed., B.A., M.A. (Bowling Green), 1966, 
Instructor in English

KARLIS I. ATORS, Dipl. (State Technikums in Riga), Dipl. Ingen. 
(UNRRA Univ., Germany), M.S.C.E. (Univ. of Calif.), P.E. (Mass.), 
1967, Assistant Professor of Civil Engineering

ALBERT T. AWAD, B.S., M.S. (Cairo U.), Ph.D. (Ohio State), 1966, 
Associate Professor of Pharmacognosy, Chairman, Department of 
Pharmacognosy

ALBERT A. BAILLIS, A.B., LL.B., (Western Reserve), LL.M. (New York), 1957, Professor of Law

J. WAYNE BAKER, A.B. (Murray, Ky.), M.A.L.S. (Indiana), 1967, Head Librarian with rank of Associate Professor

THOMAS W. BANKS, B.A. (Memphis State), M.A., Ph.D. (Emory U.), 
1966, Assistant Professor of English

HAROLD D. BARKER, A.B., (Glenville State), M.A. (Kent State), 1964, 
Instructor in History

CAROLINE B. BECKER, B.A. (Southwestern), B.D. (Garrett), M.A. 
(Northwestern), Ph.D. (Drew), 1967, Assistant Professor of Philosophy and Religion

HERMAN D. BEHRENS, B.S.Ed. (Kansas), M.A., Ph.D. (Ohio State), 1961, 
Professor of Education

GEORGE E. BELCH, B.A. (Austin), M.A. (Texas), 1960, Assistant Professor of English

LeROY D. BELTZ, B.Sc.Pharm. (Nebraska), Ph.D. (Connecticut), 1966, 
Dean, College of Pharmacy, Professor of Pharmacy

FRANCES HARRIET BENNETT, B.S.Ed., A.M. (Ohio State), 1952, 
Associate Professor of English

JOHN A. BERTON, A.B., A.M., Ph.D. (Illinois), 1967, Chairman, Depart- 
ment of Mathematics, Professor of Mathematics

DONALD J. BETTINGER, B.S. (Miami, Ohio), M.S. (Cincinnati), Ph.D. 
(North Carolina), 1963, Chairman, Department of Chemistry, Professor of Chemistry, Head, Division of Natural Sciences and Mathematics

HILDEGARDE E. BEYER, A.B. (Elmhurst), B.S.L.S. (Western Reserve), 
1966, Assistant Librarian with the rank of Instructor
ROBERT BOWDEN, A.B. (Haverford), B.S. (Ohio Northern), A.M. (Michigan), 1952, Chairman, Department of Biology, Professor of Biology

LESTER E. BOWSHER, B.S. (Ohio Northern), M.S. (St. Francis), 1967, Instructor in Mathematics, Western Ohio Educational Foundation, Celina, Ohio

GEORGE BRABSON, B.A. (Tennessee), LL.B. (Yale), M.A. (George Washington), 1962, Professor of Law

JUDITH A. BRANDT, B.A. (Ohio University), J.D. (Ohio Northern), 1964, Librarian, College of Law, Assistant Professor

PATRICK L. BROCK, B.S. (Lewis & Clark), M.S. (Oregon), 1966, Program Director, McIntosh Center

BRUCE E. BURTON, B.S.M.E. (Ohio U.), M.A.E. (Chrysler Inst. of Engr.), M.S. (Ohio State), (Colorado), P.E. (Ohio), 1958, Chairman, Department of Mechanical Engineering, Associate Professor of Mechanical Engineering

CHARLES L. BUSCH, B.S.E.E. (Ohio Northern), (Pittsburgh), E.I.T. (Ohio), 1963, Instructor in Engineering, Director of Computer Center

DANIEL R. BUTLER, JR., B.S. (Florida), Ph.D. (Ohio State), 1961, Associate Professor of Biology

LARRY R. CANNON, B.A. (Ohio Northern), M.A. (Western Michigan), 1966, Admissions Counselor

CHARLES CARLSON, A.B. (Bard), A.M. (New York Teachers College), 1962, Assistant Professor of Business Administration, Western Ohio Educational Foundation

SILAS EARL CARMEAN, JR., B.S.E.E. (Ohio Northern), M.S., Ph.D. (Ohio State), P.E. (Ohio), 1960, Associate Professor of Electrical Engineering

K. STARR CHESTER, B.A., M.S. (Boston), M.S., Ph.D. (Harvard), 1964, Professor of Biology

JANET P. CISLER, B.A. (Malone), 1966, Instructor in English, Riverside Hospital

ALFRED E. COHOE, B.A. (Albion), M.A. (Bowling Green), 1962, Assistant Professor of Sociology and Psychology, Counselor in the Guidance Center
PHILIP W. COMPTON, B.A. (Manchester), M.A. (Bowling Green), 1967, *Instructor in Psychology, Director of Testing*

CHARLES F. CONKLIN, B.A. (Waynesburg), M.A., Ph.D. (Pittsburgh), 1966, *Chairman, Department of Economics and Business Administration, Professor of Economics, Head, Division of Social Sciences*

OSCAR W. COOLEY, A.B. (Middlebury), M.S. (Butler), 1956, *Associate Professor of Economics*

HAROLD COTSAMIRE, B.B.A. (Ohio State), 1957, *Controller with rank of Assistant Professor*

MARK D. COVERT, B.S.Ed. (Bowling Green), M.Ed., (Kent State), 1967, *Instructor in Health and Physical Education*

WILLIAM ROBERT CRIDER, B.S. in Soc. Adm. (Ohio State), M.Ed., (Bowling Green), 1961, *Acting Chairman, Department of Sociology and Psychology, Assistant Professor of Psychology*


OSCAR G. DARLINGTON, A.B., A.M. (Penn State), Ph.D. (Pennsylvania), 1955, *Professor of History (Leave of absence)*

ROBERT RALPH DAVIS, JR., B.A., M.A. (Kent State), Ph.D. (Michigan State), 1966, *Assistant Professor of History*

JOHN E. DAWSON, A.B., M.S., Ph.D. (Cincinnati), 1964, *Associate Professor of Biology*

JAMES H. DeVORE, B.F.A., M.F.A. (Ohio U.), 1967, *Assistant Professor of Art*

CLYDE H. DORNBUSCH, B.A. (DePauw), M.A., Ph.D. (Duke), 1962, *Chairman, Department of English, Associate Professor of English, Head, Division of Humanities*

LON B. DOUDNA, B.A. (Wisconsin), M.Mus. (Indiana), 1965, *Instructor in Music*

EUGENE K. EAKIN, A.B. (Findlay), S.T.B. (Western Theol. Sem.), M.Ed., Ph.D. (Pittsburgh), LL.D. (Findlay), 1958, *Academic Vice President with rank of Professor*

MARILYNNE S. ELLERY, B.S.Ed. (Ohio Wesleyan), M.E. (Toledo), 1968, *Assistant Professor of Elementary Education*
MARVIN ENGLISH, B.S. (Ohio Northern), A.M. (Columbia), 1949, Chairman, Department of Health and Physical Education, Associate Professor of Physical Education

WILLIAM F. ERBELDING, B.S. (Rochester), Ph.D. (Cornell), 1966, Assistant Professor of Chemistry

RONALD L. EVANS, B.S.Ed. (Ohio Northern), M.A. (Bowling Green), 1966, Instructor in Mathematics

FRANKLIN D. FARRINGTON, B.S.M.E. (Ohio Northern), M.S. (Arizona), P.E. (Ohio), 1961, Assistant Professor of Mechanical Engineering (Leave of absence)

ROBERT PAUL FITCH, B.A. (Monmouth), M.S. Ed. (Indiana U.), M.A. L.S. (Peabody), 1967, Librarian with rank of Assistant Professor

WILLIAM P. FLEMING, B.B.A., M.A., (Sam Houston State), 1966, Instructor in English

LAWRENCE E. FRANK, B.S. (Ohio State), 1966, Instructor in Mathematics

FRANCIS A. GANGEMI, B.S. (Notre Dame), M.S., Ph.D., (Catholic U.), 1967, Associate Professor of Physics

DAVIDA P. GATES, A.B. (Catawba), M.A. (North Carolina), M.A. (Colorado), 1966, Assistant Professor of Sociology

WARREN E. GATES, A.B., M.A. (Miami, Fla.), Ph.D. (Colorado), 1966, Professor of French, Chairman, Department of Foreign Languages

LOUIS S. GIBB, B.S., M.A. (Nebraska), 1964, Vice President for Development and Public Relations, with the rank of Professor

JOANNA N. GIDWANI, B.A. (Oberlin), M.A. (Wellesley), Ph.D. (Ohio State), 1964, Assistant Professor of Biology, Riverside Methodist Hospital

ROBERT J. GLASS, B.E. (Yale), M.E. (Geo. Washington), Ph.D. (Maryland), 1967, Professor of Mechanical Engineering

JAMES D. GOODRICH, B.A. (Miami, Ohio), Ph.D. (Texas), 1964, Associate Professor of Chemistry

THOMAS L. GORDON, B.F.A., M.F.A. (Ohio U.), 1966, Assistant Professor of Art

BRUCE A. GRIMES, B.F.A. (Millikin U.), M.F.A. (Ohio U.), 1964, Assistant Professor of Art
RONALD E. GUENTZLER, B.S.E.E., M.S.E.E. (Case Inst.), 1967, Assistant Professor of Electrical Engineering

DANIEL S. GUY, A.B. (Ohio Wesleyan), J.D. (Ohio Northern), LL.M. (Michigan), 1959, Professor of Law, Assistant Dean

CAROL J. HAGEN, B.A. (Ohio Northern), 1967, Instructor in English, Western Ohio Educational Foundation

MARY KATHARINE HAMMOND, B.A. (Swarthmore), M.A. (Delaware), 1963, Instructor in History and Political Science

EUGENE N. HANSON, A.B. (Luther), A.M., J.D. (Wisconsin), LL.M. (Michigan), 1947, Dean, College of Law, Professor of Law

KATIE LOU HANSON, A.B., A.M. (South Carolina), Ed.D. (Columbia), 1948, Professor of Education

RICHARD B. HART, B.S. (Franklin & Marshall), Ph.D. (Minnesota), 1966, Assistant Professor of Chemistry

GEORGE E. HASSELL, B.A. (Col. of the Ozarks), M.B.A. (Ohio State), 1966, Vice President for Financial Affairs with the rank of Assistant Professor

A. LOUISE HASTINGS, A.B., M.A., Ph.D. (Indiana), 1957, Professor of English

BYRON L. HAWBECKER, B.A. (Manchester), M.S. (Arizona), 1963, Assistant Professor of Chemistry

WILLIAM C. HECK, JR., B.S. in Bus. Adm. (Indiana U. Sch. of Bus.), 1967, Development Associate

LINDA L. HELM, B.A., M.A. (Western Kentucky), 1967, Instructor in Physical Education, Riverside Methodist Hospital

GEORGE T. HILDAHL, B.S., M.S. (Wisconsin), 1967, Assistant Professor of Chemistry, Western Ohio Educational Foundation

ROBERT H. HILLIARD, A.B., B.S.Ed., A.M., Ph.D. (Ohio State), 1946, Chairman, Department of History and Political Science, Professor of History

HAROLD H. HINDERLITER, A.B. (Houghton), S.T.B. (Wesley Theological Sem.), Ph.D. (Vanderbilt), 1960, Associate Professor of Philosophy and Religion
FLOYD W. HOCH, B.S.Ed. (Ohio Northern), M.A. (Bowling Green), 1961, Assistant Professor of Biology

IVAN C. HODGES, A.B. (Taylor), S.T.B. (Boston), A.M. (Earlham), 1955, Assistant Professor of Philosophy and Religion

THEODORE M. HOLLIS, B.A. (San Jose State), M.S. (Ohio State), 1966, Instructor in Biology, Riverside Methodist Hospital

HENRY HORLDT, (Technical School, Karlsruhe, Germany), B.S.M.E. (Michigan Technological University), P.E. (Michigan), 1958, Professor of Mechanical Engineering

LARRY L. HUNGERFORD, B.S. (Huntington), M.A. (Ball State), 1967, Assistant Professor of Education

ADA L. HUNT, B.A. (Ohio Wesleyan), M.A. (Ohio State), 1964, Instructor in English

HAZEL C. HURLBURT, A.B. (Ohio Northern), M.N. (Western Reserve), M.A. (Ohio State), Director of Nursing Education, Riverside White Cross School of Nursing, Riverside Methodist Hospital, Columbus, Ohio

C. DENNIS IGNASIAS, A.B. (Aquinas), M.A., Ph.D. (Michigan State), 1966, Assistant Professor of History

FLORINE B. JACOBS, Ph.C. (Ohio Northern), 1966, Dean of Women with rank of Instructor

OSCAR JACOBS, B.S.E.E., B.S.Ed. (Ohio Northern), P.E. (Ohio), 1962, Director of Admissions with rank of Assistant Professor

BRUCE E. JOHANSEN, B.E.S. (Cleveland State), M.S. (Pittsburgh), 1967, Assistant Professor of Electrical Engineering

HILDRED B. JONES, A.B. (Blue Ridge College), A.M. (West Virginia), Ph.D. (Pittsburgh), 1954, Director of Placement, Professor of Education

RICHARD D. KAIN, B.S. (Ohio Northern), M.A. (Ohio State), 1953, Chairman, Department of Industrial Arts, Associate Professor of Industrial Arts

HAZEL KEENER, B.A. (Ohio State), M.S.L.S. (Western Reserve), 1965, Librarian, with the rank of Instructor

RONDA LOU KERR, B.S.Ed. (Capital), 1965, Instructor in Health and Physical Education
TERRY D. KEISER, B.S.Ed. (Ohio Northern), M.A. (Bowling Green), 1967, Instructor in Biology

ROBERT H. KEYSER, B.S.C.E., M.S. (Michigan State College), Ph.D. (U. of Wisconsin), P.E. (Ohio), 1966, Professor of Civil Engineering

JOHN J. KISSELL, B.A. (Notre Dame), 1965, Assistant Professor of Speech and Theater, Director of Theater

JAMES L. KLINGENBERGER, B.S.E.E. (Ohio Northern), M.S. (Ohio State), P.E. (Ohio), 1949, Chairman, Department of Electrical Engineering, Professor of Electrical Engineering

GEORGE R. KNELLER, B.A. (Findlay), M.A. (Bowling Green), 1967, Instructor in Speech

ENNO KOEHN, B.C.E. (City College, N.Y.), M.S. (Columbia), M.C.E. (New York U.), P.E. (New York), 1967, Associate Professor of Civil Engineering

FREDERICK I. KUHNS, B.A. (Ohio State), B.D. (Union), A.M. (Chicago), Ph.D. (Chicago), 1960, Librarian with rank of Associate Professor

KATHRYN Z. KUHNS, B.A. (State Teachers College, N.D.), M.Ed. (Montana), 1960, Assistant Professor of Mathematics

CHARLES G. LAING, Ph.B., Ph.D. (Chicago), 1966, Assistant Professor of Biology

CLYDE A. LAMB, B.S. (Coe), A.M. (Columbia), 1929, Professor of Physical Education

RICHARD E. LASKO, B.S.Ed., M.Ed. (Ohio), 1962, Assistant Professor of Music

MARGARET E. LAUTENBACH, B.M. (Capital), M.A. (Ohio State), 1967, Instructor in Music

GAYLE E. LAUTH, B.S.Ed. (Ohio U.), M.S. (Indiana), 1967, Instructor in Women’s Physical Education

EARL E. LHAMON, B.A., B.S.E.E. (Ohio Northern), M.A. (Bowling Green), 1959, Assistant Professor of Mathematics (Leave of absence)

BERNARD L. LINGER, B.Mus., M.Mus. (West Virginia), Ph.D. (Florida State), 1967, Assistant Dean, College of Liberal Arts, with rank of Associate Professor of Music
MARY A. LUCAS, B.S.Ed. (Ohio Northern), 1967, Admissions Counselor

HELEN LUDWIG, B.S.Ed. (Ohio Northern), M.Ed. (Bowling Green), 1963, Instructor in Health and Physical Education

JUDSON P. McCLURE, B.S. (Bob Jones U.), Ph.D. (Colorado), 1963, Associate Professor of Chemistry

RALPH L. McFARLAND, B.S.Ed. (Wilmington), 1957, Director of Financial Aids with rank of Instructor

MORTON L. MALLIN, B.S. (P.C.P. & S.), M.S. (Hahnemann), Ph.D. (Cornell), 1964, Associate Professor of Microbiology, Chairman, Department of Microbiology

DAVID H. MARKLE, A.B. (Ohio Wesleyan), B.D., A.M., Ph.D. (Yale), 1949, Professor of Sociology

L. SCOTT MARTENS, B.A. (Ohio Northern), 1967, Development Associate

ROBERTO B. MARTINEZ, B.A. (Santiago Pre-Univ. Inst.), M.Ed., Ed.D. (Havana), 1967, Assistant Professor of Spanish

PAUL D. MATTHEW, A.B., M.A. (Miami, Ohio), 1967, Instructor in English

DONALD JAY MAXWELL, B.A., M.A. (Missouri), D.Mus. (Florida State), 1966, Professor of Music, Dean of the College of Liberal Arts

GERALD R. MESSICK, B.S.E.E. (Ohio Northern), M.S. (Pittsburgh), 1958, Assistant Professor of Physics

SAMUEL LEWIS MEYER, A.B. (Central), M.S. (Vanderbilt), Ph.D. (Virginia), LL.D. (Central), LL.D. (Ohio Wesleyan), 1965, President of the University, Professor of Biology

LARRY LEE MICHAEL, B.S.Ed. (Ohio Northern), M.E. (Bowling Green), 1960, Assistant Professor of Health and Physical Education

ROBERT L. MIDDLETON, B.S.Ed. (Ohio State), M.Ed. (Bowling Green), 1967, Instructor in Health and Physical Education

DONALD E. MILKS, B.C.E. (Clarkson), M.S., Ph.D. (Arizona), P.E. (Arizona), (Ohio), 1965, Associate Professor of Civil Engineering, Chairman, Department of Civil Engineering

GEORGE B. MILLER, JR., B.S.A.E. (Georgia Tech.), M.Ed. (Emory), Ed.D. (Georgia), 1960, Dean of Students, Professor of Psychology
JOSEPH L. MILLER, B.S.Ed. (Ohio Northern), M.Ed. (Bowling Green), 1965, Instructor in Health and Physical Education

ANTHONY L. MILNAR, A.B. (Upsala), M.S. in Ed. (Indiana), Ph.D. (Georgetown), 1955, Professor of History and Political Science

ROBERT L. MOFFITT, B.S., M.A. (South Dakota), Ph.D. (Louisville), 1966, Professor of Pharmacology, Chairman, Department of Pharmacology

JAMES L. MOORE, A.B. (West Virginia), M.A. (Marshall), 1966, Registrar with the rank of Assistant Professor

EDGAR NAGY, J.U.D. (Budapest), 1966, Assistant Professor of German

ERIC V. NELSON, B.S., M.S. (Wisconsin), Ph.D. (Manitoba), 1967, Assistant Professor of Biology

CHARLES M. OLIVER, B.S. (Western Kentucky), A.M. (Missouri), 1965, Instructor in English

MICHAEL R. PALMISANO, B.S.Ed. (Michigan), M.Ed. (Miami, Ohio), 1966, Instructor in Health and Physical Education

MIRIAM S. PARKHILL, B.A. (Ohio Northern), M.A. (Ohio State), M.A.L.S. (Michigan), 1963, Assistant Librarian, with the rank of Instructor

B. GAIL PARSONS, B.S., M.S. (Indiana), 1964, Assistant Professor of Education

DAVID J. PATTERSON, B.A. (Ball State), J.D. (Detroit), LL.M. (Michigan), 1966, Assistant Professor of Law

EMMA C. PELLER, B.S. (Western Reserve), M.A. (Cincinnati), 1967, Assistant Professor of French

PRISCILLA A. PORTER, B.S. (Northwest Missouri), M.A. (Bowling Green), 1966, Instructor in Speech

ROBERT P. PRICE, A.B. (Southwestern), A.M. (Columbia), 1951, Associate Professor of English

NORMAN K. QUICK, B.A. (Ohio Northern), 1965, Development Associate

JAMAL A. RASSOUL, B.A. (Bagdad), 1966, Instructor in Economics and Business Administration
NORMAN J. REX, B.S.Ed. (Ohio Northern), M.Ed. (Ohio U.), 1967, Assistant Professor of Industrial Arts

ARDEN ROBERSON, B.S.Ed. (Ohio Northern), M.E. (Kent), 1960, Assistant Professor of Physical Education

DONALD L. ROBERTSON, A.B. (Miami), J.D. (Cincinnati), B.D. (United Theol. Sem.), LL.M. (Harvard), 1965, Associate Professor of Law

WILLIAM L. ROBINSON, B.S.Ed. (Ohio Northern), M.A. (Bowling Green), 1961, Dean of Men with rank of Assistant Professor

CATHERINE L. ROIDER, A.B. (Rochester), M.A. (Bowling Green), 1959, Assistant Professor of Mathematics

KARL ANDREW ROIDER, B.Mus. (Eastman School of Music), M.Mus. (Rochester), Ed.D. (Columbia), 1945, Chairman, Department of Music, Professor of Music and Music Education, Head, Division of Fine Arts

RONALD E. ROLL, B.S., M.S. (Ohio State), 1964, Assistant Professor of Physics

VIRGIL R. RUBECK, B.S., M.S. (Indiana State), Ed.D. (Indiana U.), 1962, Associate Professor of Education

WILLIAM C. RUST, JR., B.A., J.D. (Calif. Western U.), LL.M. (Indiana U.), 1967, Assistant Professor of Law

GEORGE A. SAGONOWSKY, Baccalaureate (State Lyceum, Rovno, Poland), Mag. Phil. (State U. of Lvov), 1967, Assistant Professor of German

GEORGE W. SCHERTZER, A.A. (Ohio Northern), 1956, Alumni Secretary

MONTY SIEKERMAN, A.B. (Hanover), 1967, Director of Public Information

ALBERT CHARLES SMITH, B.S. in Pharm. (Ohio State), M.S., Ph.D. (Purdue), R.Ph. (Ohio, Indiana), 1944, Professor of Pharmaceutical Chemistry, Chairman, Department of Pharmaceutical Chemistry

BOYD M. SOBERS, B.A. (Ohio Northern), M.A. (Western Reserve), 1956, Assistant Professor of History

WERNER SONNTAG, B.S.Mus.Ed., M.A.Mus.Ed. (Ohio State), 1963, Assistant Professor of Music
GEORGIA P. SPELMAN, A.B. (Eureka), M.A. (Bradley), 1959, **Assistant Professor of Speech (Leave of absence)**

HERBERT S. SPENCER, B.S. in Fine Arts (Nebraska), M.A. (Columbia), Ph.D. (Nebraska), 1962, **Professor of Education**

JIMMIE O. STAHL, B.S.Ed. (Ohio Northern), M.Ed. (Bowling Green), 1963, **Director of McIntosh Center with rank of Instructor**

JOHN P. STAHL, B.S.E.E. (Ohio Northern), M.S.E.E. (Case Institute), 1966, **Assistant Professor of Electrical Engineering**

ROGER J. STAUFFER, B.S. (Ball State), M.A. (Columbia), 1959, **Resident Director of Western Ohio Educational Foundation, Celina, Ohio, Assistant Professor of Business Administration**

DAVID M. STUART, B.S. (Utah), Ph.D. (Wisconsin), 1964, **Professor of Pharmaceutical Chemistry**

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