THE GEORGE FRANKLIN AND SARAH CATHERINE GETTY

College Of Liberal Arts

DONALD JAY MAXWELL, Dean

DIVISIONS AND DEPARTMENTS

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

NATURAL SCIENCES: Biology, Chemistry, Mathematics, Physics.

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

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

OBJECTIVES

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

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

In addition to the general requirements for admission to the University stated in this catalog, the College of Liberal Arts accepts graduates of high school and non-graduates with sixteen acceptable units of high quality work who are recommended by the high school principal. Twelve of these units shall be in any combination of the following subjects: English (four years), languages, history, two units in mathematics (including algebra and plane geometry), and natural science.

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 the Evening Division 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: Courses prescribed in the program of general education include one year of English Composition; a quarter of Speech; two full year, nine credit hour sequence courses in two different social sciences (two 5-hr. courses in the Department of Psychology and Sociology may satisfy one year’s requirement); Historical Study of Philosophy and Religion (or a one-year course in Philosophy and Religion upon approval of the Chairman of the Department of Philosophy and Religion); six quarters in two of the Natural Sciences, including Mathematics 111, 112 and 113; one full year of advanced work in American or English Literature; two quarters in Art, Music, Theatre, or a foreign language cultural course; and two years of one foreign language or the equivalent.

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

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

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

THE DEGREE OF BACHELOR
OF SCIENCE

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

THE DEGREE OF BACHELOR
OF SCIENCE IN EDUCATION

The prescribed general education courses for the Bachelor of Science in
Education degree are: One year English Composition; a quarter of Speech; two
full year, nine credit hour sequence courses in two different Social Sciences,
other than Psychology; Historical Study of Philosophy and Religion (or a one-
year course in Philosophy and Religion, by the approval of the Chairman of the
Department of Philosophy and Religion); a minimum of twenty-one hours of
Natural Science, including Mathematics 111, 112 and 113, or equivalent Mathe-
matics courses; one full year of advanced work in American or English Literature
and two quarters of Art, Music, Theatre or a foreign language cultural course.
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 coursework. The above regulation also applies to students working toward the degree of Bachelor of Arts and teacher certification.

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

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

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

PRE-PHARMACY

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

COMBINATION CURRICULA

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

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

PRE-PROFESSIONAL CURRICULA LEADING TO THE BACHELOR OF ARTS DEGREE

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

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

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

Pre-Dentistry, Arts-Medical Technology, Arts-Nursing. These students meet with the medical sciences committee for counsel concerning preparation for the respective areas of professional study. In order to receive a Bachelor’s degree from Ohio Northern University most students will need to complete four years of undergraduate study. (The Arts-Nursing Program combines a diploma nursing program from a hospital school of nursing with the regular Bachelor of Arts degree program and should not be confused with the Bachelor of Science in Nursing offered at many universities).
RELIGIOUS EDUCATION

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

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

PRE-THEOLOGY

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

PRE-LAW

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

FOREIGN AND PUBLIC SERVICE

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

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

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

3. The student indicates his choice of a major field by filling out a Declaration of Major card available in the office of the Dean of the college or the Registrar, and secures the signature of the department chairman. The completed card indicates that the department accepts a student as a major. To change from one department to another, the student shall complete a Change of Major card, also obtainable as indicated above. A student is officially accepted as a major in a department only when he has completed the above procedure. 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 taking courses in the "100" series in other than foreign languages or mathematics must complete additional work of a high quality for full credit. Seniors selecting "100" courses should consult the Dean of the college.

6. 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.

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.

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

SENIOR COMPREHENSIVE EXAMINATION

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

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

GRADUATION

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

THE DEPARTMENTAL COURSES

ART

(Department 111)
Associate Professor West (Chairman), Assistant Professors Mr. Gordon, Mr. 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.

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

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

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

101, 102. ART FOR ELEMENTARY TEACHERS. Designed for prospective elementary classroom teachers with emphasis on theory, materials, techniques. Lecture and lab. 101 prerequisite for 102. 6 hours.

111, 112, 113. DRAWING AND DESIGN. Theories and techniques of drawing in various media, including plastic elements in two and three dimensions. Lab. Required of all Art Majors. 9 hours.
121, 122, 123. **Studio Concepts.** Application of drawing and design concepts to specific studio discipline in painting and sculpture. A coordinate course to 111, 112, 113. Lab. 6 hours.

140. **Art History Survey.** An historical survey of style in painting, sculpture, and architecture from pre-historic time to the present. Illustrated lecture. 3 hours.

200. **Introduction to Art.** A survey of the visual arts. Emphasis upon aesthetic theory, appreciation, and judgment. Illustrated lecture. 3 hours.

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

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

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

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

310. **Advanced Figure Study.** Drawing, painting, and sculpting from the live model. Prerequisite: 3 hrs. Art 210. May be repeated to 9 hrs. of credit. 3 hours.

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

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

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

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

401, 402, 403. **Printmaking.** 401: Relief processes (woodcut, etc.). 402: Planographic processes (lithography and silkscreen). 403: Intaglio processes (etching, etc.). Permission of instructor.
410. ADVANCED CERAMICS. 
Prerequisite: 321, 322, permission of instructor. May repeat to a total of 9 hours. 1-3 hours.

420. ADVANCED PAINTING. 
Prerequisite: 12 hours of painting (any series), and permission of instructor. May repeat to total 9 hours. 1-3 hours.

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

450. ANCIENT AND MEDIEVAL. Study of art from pre-historic era to the 14th century. Illustrated lectures. No prerequisite. 3 hours.

460. RENAISSANCE AND BAROQUE. Illustrated lectures on the art of the 15th, 16th and 17th centuries in Italy and Northern Europe. 3 hours.

470. IMPRESSIONISM AND POST IMPRESSIONISM. Emphasis on developments in French Art between the Revolution of 1848 and 1900. 3 hours.

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

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

BIOLOGY
(DEPARTMENT 121)

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

The objectives of the department are to make each student aware of the nature and content of the sciences with biology as an example; to make him aware of the relevance of biology to the society of which he is a citizen; to provide a firm foundation for advanced work in biology and in the related applied sciences. General Biology is a course designed to attain these objectives. It also provides the generalizations by which majors can relate their advanced courses to one another and is therefore prerequisite to all other courses in the major curriculum.
Additional requirements for majors are:

1. Courses in the biology of organisms
   plants (201-202) or
   microbiology (361, 362) (offered in College of Pharmacy)
   animals (223), (301-303) or (331-333)
2. Genetics (430)
3. Ecology (423)
4. Experience in techniques and instrumentation (341-342-343)
5. Experience as an investigator (440)
6. Active participation in seminars (450)
7. Preparation in cognate areas:
   mathematics through statistics
   chemistry through organic
   physics one year
   foreign language second year
8. A comprehensive examination

Courses in psychology and sociology are recommended.

111-112-113. General Biology (5). Discussion in the presence of laboratory materials. Biological principles and concepts of plant and animal life, stressing their application to man. 12 hours.

Alternate 111-112-113. General Biology. Independent Study Program. The student’s rate and method of study are given maximum independence under department supervision. Consult the chairman. 12 hours.

201-202. The Seed Plant as an Organism (3 + 3). The relationship of structure to function during ontogeny followed by a brief consideration of phylogeny. Prerequisite: General Biology 113. 8 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 freshman and sophomores. 1 hour.

301-302-303. **DEVELOPMENTAL ANATOMY (2 + 6).** Biological principles involved in the embryonic development, the structural changes and the resulting functional modifications of the vertebrates. Prerequisite: General Biology 113. 12 hours.

331-332-333. **PHYSIOLOGY (3 + 3).** A structural and functional approach to the human body including physiological principles at the cellular, tissue and organ-system level. Prerequisite: General Biology 113, Chemistry 233. 12 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 within the ecosystem. Prerequisite: Biology 202, 223, Math 193. 3 hours.

430. **GENETICS (3 + 3).** The principles of genetics as exemplified by micro-organisms, higher plants and animals. Mendelian, biochemical, developmental and population genetics are considered. Prerequisite: Biology 113, Chemistry 133 or 143, Math 193. 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 each quarter of senior year. 1 hour.

**CHEMISTRY**

(Department 122)

Profsessors Bettinger (Chairman), Wilhelm; Assistant Professors Erbelding, Goodrich, Hart, McClure, Sund; Instructor Hawbecker.

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

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

The Bachelor of Arts program is designed primarily for those who wish a chemistry major in preparation for medicine, secondary school teaching, or any other field which requires background in chemistry.

All chemistry majors fulfill basic university and College of Liberal Arts requirements, take German 221-2-3 or German 224-5-6 and Chemistry 131-132-143, 240, 241-242-243, 321, 340, 341-342-343, (440).

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

Outlines of the basic curricula for the chemistry majors are available from the department chairman.

Chemistry 110. THE SCIENCE OF CHEMISTRY. For the non-science major, designed to provide an orientation to and understanding of the fundamental nature of physical science from the chemist's viewpoint. Emphasis is placed on the structure of matter and the consequences of that structure. (3 + 3) Prerequisite: Mathematics 111 and 112 or concurrent enrollment in Mathematics 151 or 191. 4 hours.

131, 132, 133 or 143. GENERAL CHEMISTRY. Chemistry 131 and 132 include basic principles and use of modern theory and periodic relationships to explain descriptive chemistry. Chemistry 133 is for the student who terminates his study of chemistry with one year, and includes selected topics from organic chemistry. Chemistry 143 is prerequisite for advanced courses in chemistry and includes application of chemical equilibrium, principles of quantitative analysis and the chemistry of the transition elements. The laboratory for general-chemistry illustrates principles, basic quantitative techniques and methods of separation of ions in aqueous solutions. Chemistry 131-132-133 (3 + 3). Chemistry 143, (3 + 6). Prerequisite: Mathematics 111-112-113 or concurrent enrollment in Mathematics 151 or 191. 12-13 hours.

161-162-63. HONORS IN GENERAL CHEMISTRY. Enrollment by invitation of the chairman. Corequisite: Concurrent enrollment in Chemistry 131-2-3 or 143. 3 hours.
231-232-233. **Organic Chemistry.** Organic compounds, applying the modern approach to bonding, structure, and mechanisms of reaction. (3 + 3). Prerequisite: Chemistry 143. 12 hours.

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 143. 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 and 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.

341-342-343. **Physical Chemistry.** Fundamentals, emphasizing thermodynamics, kinetics, quantum theory, and structure of matter. (3 + 3). Prerequisite: Physics 231, 232 and Math 252 or 341. Corequisite: Chemistry 233 or 243 and Physics 233. C or better is required in prerequisite courses. 12 hours.

363. **Advanced Organic Chemistry.** An extension of the first course in organic emphasizing bonding concepts, mechanisms of organic reactions, and interpretation of spectral data. (4 + 4). Prerequisite: Chemistry 343. 5 hours.

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. The laboratory stresses correlation of theory, reaction chemistry and techniques used in synthesis. (4 + 4). Prerequisite: Chemistry 343. 5 hours.
Chemistry Laboratory
462. ADVANCED ANALYTICAL CHEMISTRY. The theory and application of instrumental analysis. (4 + 4). Prerequisite: Chemistry 343. 5 hours.

473. ADVANCED PHYSICAL CHEMISTRY. Four hours of lectures per week. Prerequisite: Chemistry 343. 4 hours.

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

ECONOMICS AND BUSINESS ADMINISTRATION

(Department 131)

Professor Conklin (Chairman); Associate Professor Cooley; Assistant Professor Carlson; Instructors Rassoul, Young; Lecturers Bair, DaPore, Darwood, Feth, Purdy, Purmort, Moore, White.

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. Detailed curricula in these areas are available from the department chairman.

A student majoring in the department must complete a minimum of 45 hours in the department including courses 131, 132, 133, 201, 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) and the second year of a foreign language. Seniors should take a senior seminar in preparation for the senior comprehensive.

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

201-202-203. PRINCIPLES OF ECONOMICS. An analytic description of our economic system; the price system, money and banking and the economy of producers and consumers; income and employment, current economic problems. 9 hours.
213. **Business Organization.** The various types of business and industrial organizations, recent trends in management, and methods required for administrative, managerial and industrial control. 3 hours.

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

312. **Cost Accounting.** Accounting for manufacturing enterprises with emphasis on job order process and standard cost accounting. Prerequisite: Intermediate Accounting 301. 5 hours.

322-323. **Business Law.** Legal aspects of common business transactions, contracts, 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. 3 hours.

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

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

362. **Corporation Finance.** Handling and flow of corporate funds; problems of fixed and working capital, income level, dividend policy and the use of borrowing; case analysis used. 3 hours.
363. Personnel Management. The functions of the personnel department in industry. Case analysis of problems in selection, training, and incentives; the human factor in industry. 3 hours.

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

371. Salesmanship. The principles, techniques and problems of salesmanship; sales management, recruiting, controlling and evaluating the sales force; market research, channels of distribution and pricing. 3 hours.

372. Advertising. Advertising as a phase of the marketing process; selling appeals and types of advertising; consideration of copy and media; problems of publishing and broadcast advertising. 3 hours.

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

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

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

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 output, economic growth, and price stability. Prerequisite: Economics 201-202-203. 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. 3 hours.

391. Business Communications. The techniques of writing business letters and reports; efficient and accurate communication of economic and business facts and presentation of conclusions for management decision-making; further study of English for self-improvement. 3 hours.
403. AUDITING. Auditing accounting records and statements, making of working papers and the writing of audit papers for making a complete audit. Prerequisite: Intermediate Accounting 301. 5 hours.

411. COMPARATIVE ECONOMIC SYSTEMS. Capitalism, socialism, fascism and communism as they touch on the economics of pricing, production and distribution. 3 hours.

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

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

432. ACCOUNTING SYSTEMS. 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. Required of all senior majors. 3 hours.

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

442. 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. 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. Study of the 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. 3 hours.

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

EDUCATION

(DEPARTMENT 141)

PROFESSORS BEHRENS, HANSON, JONES, SPENCER; ASSOCIATE PROFESSORS VAY-HINGER (Chairman), RUBECK; ASSISTANT PROFESSORS ELLERY, PARSONS, VAN ATTA; INSTRUCTORS CHESTER, 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 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 instructor, and Health Department
3. Action by the Teacher Education Council.

Students preparing to teach at either elementary or secondary level must have their programs approved by the Head of the Division of Teacher Education. Those students preparing to teach at the secondary level must meet the requirements in an area of concentration under the direction of the appropriate chairman.
1. **Elementary Education**
   
a. Provisional Elementary Certificate and Bachelor of Science in Education Degree.

   The courses listed below meet the requirements for the Bachelor of Science in Education degree and the Provisional Elementary Certificate (standard certificate)

   - Education 121—Introduction to Education 3 hours
   - Education 223—Child Development 3 hours
   - Education 233—Children’s Literature 3 hours
   - Education 308—Teaching Arithmetic 3 hours
   - Education 309—Teaching of Science for the Elementary Teacher 3 hours
   - Education 311—Teaching of Social Studies 3 hours
   - Education 312—Teaching of Language Arts 3 hours
   - Education 341—Teaching of Reading 3 hours
   - Education 391—Elementary School Curriculum 3 hours
   - Education 470—Student Teaching 15 hours
   - Electives in Education 9 hours

   **Total: 51 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 for students in the field of secondary education are listed below:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Education 121—Introduction to Education</td>
<td>3</td>
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<tr>
<td>Education 333—Adolescent Growth &amp; Development (Prereq: Gen. Psych. 211)</td>
<td>3</td>
</tr>
<tr>
<td>Education 370—School and Society</td>
<td>3</td>
</tr>
<tr>
<td>Education 390—High School Curriculum</td>
<td>3</td>
</tr>
<tr>
<td>Education 450—Methods of Teaching in High School or Special Methods of Teaching</td>
<td>3</td>
</tr>
<tr>
<td>452 English</td>
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<tr>
<td>453 Social Studies</td>
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<tr>
<td>454 Mathematics</td>
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<td>455 Science</td>
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<td>456 Language</td>
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<td>Music 311, 312, or 313</td>
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<td>Ind. Arts 423</td>
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<tr>
<td>Phys. Ed. 303</td>
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<tr>
<td>Education 480—Student Teaching</td>
<td>9*</td>
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<tr>
<td>Electives in Education</td>
<td>6*</td>
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</tbody>
</table>

**TOTAL**                                    | 30    |

Electives from the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Education 313—Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Education 401—History and Philosophy of Education</td>
<td>3</td>
</tr>
<tr>
<td>Education 402—School Org. and Adm.</td>
<td>3</td>
</tr>
<tr>
<td>Education 430—Audio - Visual Aids</td>
<td>3</td>
</tr>
<tr>
<td>Education 440—Special Problems in Tchr. Ed.</td>
<td>1-3</td>
</tr>
<tr>
<td>Education 460—Evaluation and Measurements</td>
<td>3</td>
</tr>
</tbody>
</table>

*Special Certification—Combined Elementary-Secondary—Student Teaching is 12 hours, elective 3 hours.
GENERAL COURSES

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

313. EDUCATIONAL PSYCHOLOGY. The learning process and conditions that promote learning. Prerequisite: Psychology 211. 3 hours.

401. HISTORY AND PHILOSOPHY OF EDUCATION. Modern educational practice; historical changes in instructional processes and ideas; educational beliefs and points of view; the purpose of Education in 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 administrative tasks for which a classroom teacher is responsible. 3 hours.

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

430. AUDIO-VISUAL AIDS IN EDUCATION. 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. Required of elementary education majors. Prerequisite: Psychology 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: 6 hours college math. 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: 15 hours of college science. 3 hours.

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

311. Teaching of the Social Studies in the Elementary School. Objectives, 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 of 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. Given upon sufficient demand. 3 hours.

340. Primary Methods and Materials. Programs and practices in the primary grades required of all students who are candidates for the Kindergarten-Primary Certificate. 3 hours.

341. Teaching of 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.

470. **Student Teaching in the Elementary Grades.** Planning and teaching under supervision in the elementary grades; weekly seminar on campus.

Prerequisites: senior rank; scholarship average of 2.25 or higher 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 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. 3 hours.

390. **The High School Curriculum.** Secondary school curriculum practices, instructional materials, curriculum development, curriculum, changes and trends. 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. Student Teaching—Junior and Senior High School. The work consists of planning and teaching under supervision in the junior or senior high school one-half day, five days per week for one quarter and an average of one hour per week in seminar on campus. To be eligible for student teaching the candidate must have senior rank; have a cumulative scholarship average of 2.25; 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"; have completed or be in the process of completing the following courses, preferably in this order: Introduction to Education, Adolescent Growth and Development, School and Society, High School Curriculum, Special Methods or High School Methods; teach either in his major or minor teaching field; possess a desirable teaching personality, including interest in teaching, social adaptability, the ability to get along with people, responsibility and high moral standards; must demonstrate effective communicative skills in speaking and writing; be approved by the Director of Teacher Education and by the chairman of his major department. 6, 9 or 12 hours.
ENGLISH, SPEECH AND THEATRE
(Department 112)

Professor Hastings; Associate Professors Dornbusch (Chairman), Bennett, Price; Assistant Professors T. Banks, Belch, Kissell, Spelman (on leave); Instructors R. Arthur, S. Arthur, Cisler, Fleming, Hunt, Oliver, Peck, Pogany, Porter, Zwerling; Lecturers L. Banks, Frongerhouse, E. Miller.

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

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

The Department of English, Speech, and Theatre offers the various majors described below:

ENGLISH

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. Composition (151-152-153) does not count toward a major nor does any course with a grade below “C.”

ENGLISH COURSES

151-152-153. COMPOSITION. To develop proficiency in the writing of English prose. 9 hours.

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

201-202-203. INTRODUCTION TO ENGLISH LITERATURE. A chronological study of the poetry and prose of the major British writers from Chaucer to T. S. Eliot, the development of representative English literary forms. 9 hours.
211-212-213. Introduction to American Literature. A chronological study of the poetry and prose of the major American writers from the Puritan Age to the modern period, the development of American thought and literary forms. 9 hours.

241-242-243. Journalism. Newspaper organization, procedures, and techniques. Students work closely with or are members of the staff of the *Northern Review*. 9 hours.

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

301-302. The British Novel. The development of the novel as a literary form. 301—from Defoe to Austen; 302—from Dickens to Joyce. 6 hours. Alternate years.

303. Twentieth Century American Fiction. A study of the development of the American novel after World War I, with emphasis on the major novelists. 3 hours. Alternate years.

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. Offered 1967-68.

322. Restoration and the Eighteenth Century. The prose and poetry of the major writers of the Neo-Classical period, beginning with Dryden and the Restoration and ending with Blake, the forerunner of the Romantic Period. 3 hours. Alternate years. Offered 1967-68.

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. Offered 1967-68.
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.

325. **Modern Poetry.** An intensive study of the poems of Yeats and Eliot and an introduction to the poetry of Hopkins, Pound, Frost, Stevens, Auden, and Thomas. 3 hours. Alternate years.

331-332-333. **The Drama.** The development of the drama as a literary form. 331—a study of representative plays from Sophocles through the English Restoration; 332—representative plays of Europe and England in the eighteenth and nineteenth centuries; 333—plays of modern Europe and America. 9 hours. Alternate years. Offered 1967-68.

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. 3 hours. Prerequisite: 351-352 or permission of the chairman.

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

For a major in speech the following courses are required: 261, 262, 270 (3-6 hours), 272 or 273, 351-352, 371, 372, 373, 470. Additional courses must be selected from the speech and theatre offerings to complete 45 hours. 271 does not count toward a major. No course with a grade below “C” may be counted toward a major. Two years of a modern foreign language are required. Speech majors can work toward secondary teaching certification.

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.

271. Public Speaking I. Oral Communication in the various areas of speech, practice in original public speaking and listening. 3 hours.

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

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

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

363. Advanced Oral Interpretation. Analysis and oral projection of classic forms of prose and poetry; the art of oral interpretation. Prerequisites: Speech 261 and 262. 3 hours.
371. **DISCUSSION.** Group discussion; cooperative problem solving and deliberative thinking. An opportunity to participate in and lead discussion is provided. Prerequisites: Speech 271 or 272. 3 hours.

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

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

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

**THEATRE COURSES**

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

The student in Creative Theatre 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 Theatre is required to take the following courses: Theatre 291, 292, 293, 294, 295, 296, 384, 386, 396, 482, 483, 486, 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 theatre arts courses). The curriculum will be provided in consultation with the Chairman of the Department and the Director of Theatre. For all three areas—
Creative Theatre, Technical Theatre, and Drama—two years of a modern foreign language are required. No course with a grade below “C” may be counted toward the major.

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

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

291. **INTRODUCTION TO THE THEATRE.** Drama and techniques from the beginning to the present. Meets the Liberal Arts requirements. *3 hours.*

292, 293. **THEATRE HISTORY.** Theatre from the beginnings to the eighteenth century; theatre 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 theatre 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 THEATRE.** The entire production of theatre 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 THEATRE I.** Costume and make-up instruction and practice. *6 hours.*

495, 496. **TECHNICAL THEATRE II.** Lighting and design, instruction and practice. *6 hours.*
FOREIGN LANGUAGES
(Department 113)

Professors Gates (Chairman), Schmitz; Assistant Professors Espino, Nagy; Instructors Lorenzana, Price, Rassoul, Shaulis.

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

Students with two years of high school preparation in a foreign language must begin with a 200 level course; those with four years must begin with a 300 level course. Students with three years of high school preparation must take a placement test, and may be placed in a 300 level course with permission of the instructor; or, very exceptionally, in a 200 level course by recommendation of the instructor and written permission from the Chairman of the Department.

Requirements for a major in a foreign language:

For a major in French, German, Russian 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; 410.
Russian 231-232-233; 331-332-333; 334-335-336; 431-432-433; 430.
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, Russian 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

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

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

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

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

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

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

420. FRENCH SEMINAR. For seniors majoring in French. 3 hours.

421. FRENCH SEMINAR. For seniors majoring in French. 3 hours.
GERMAN

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

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

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

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

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

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

421, 422, 423. DEUTSCHE KULTURGESCHICHTE. The course, given in German, integrates the political, economic, social and cultural forces which have shaped Germany. Required of all German majors. Prerequisite: German 221-223; 321, 322, 323, or consent of instructor. 9 hours.
430. **German Seminar.** For seniors majoring in German. 3 hours.

431. **German Seminar.** For seniors majoring in German. 3 hours.

**SPANISH**

141-142-143. **Elementary Spanish.** To develop the ability to understand, speak, read, and write Spanish; functional, rather than formal grammar; early and fluent speaking; elementary reading based on Spanish life, customs and manners, using materials dealing with Spain, Mexico and South America. *Three class periods and two scheduled laboratory practices. 12 hours.*

241-242-243. **Intermediate Spanish.** A review of grammar and pronunciation; conversational practice and composition; occasional lectures in Spanish on Spanish life, history, arts, crafts, and civilization, illustrated with film strips, slides, photographs, reproductions, and realia. *Three class periods and two scheduled laboratory practices.* Prerequisite: Spanish 141-143, or two years of high school instruction in Spanish. *12 hours.*

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

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

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

347, 348, 349. **Spanish American Literature.** Main currents of Spanish-American literature. Prerequisite: Spanish 241-243, or the consent of the instructor. *9 hours.*
441, 442, 443. Civilizacion Hispanica. This course, given in Spanish, integrates the political, economic, social, geographical and cultural forces which have shaped Spain and Hispanic America. Required of all Spanish majors. Prerequisite: Spanish 341 342, 343, or consent of instructor. 9 hours.

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

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

Russian

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

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

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

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

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

334, 335, 336. Survey of Russian Literature. Basic monuments of Russian literature from the Kiev period to the present, with special emphasis on the major classics of the nineteenth century. Prerequisite: Russian 231-233, 331-333, or the consent of the instructor. 9 hours.
431, 432, 433. Russian Civilization. A study of Russian life: intellectual, social and cultural, with emphasis on the modern period. Russian political and cultural history, the Russian Revolution of 1917 and the basic features of Marxism-Leninism. A study of Soviet life. The course is given in Russian, illustrated by slides, films and music recordings, and is required of all Russian majors. Prerequisite: Russian 231-233, 331-333. 9 hours.

440. Russian Seminar. For seniors majoring in Russian. 3 hours.

441. Russian Seminar. For seniors majoring in Russian. 3 hours.

Classical Greek

161-162-163. Elementary Greek. To develop the ability to read and interpret classical Greek; selected readings from Greek prose writers; occasional illustrated lectures on Greek civilization. 9 hours.

261-262-263. Intermediate Greek. To develop the student's skill in interpreting Greek prose and poetry from the classical period. Illustrated cultural lectures. Prerequisite: Greek 161-163, or equivalent. 9 hours.

Latin

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

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

History and Political Science

(Department 132)

Professors Hilliard (Chairman), Darlington, Milnar; Assistant Professors Sobers, Uveges; Instructors Barker, Davis, Hammond, Ignasias, Rossi.

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

The most appropriate sequence of courses for a field of concentration in history is History of Western Civilization 111, 112, 113; History of the United States 211, 212, 213; History of England 321, 322, 323; Recent American History 362; or Constitutional History of the United States 331, 332, 333; and Recent European History, 374, 375, 376. In addition to the 45 hours required for the major in History, the student must complete nine hours in American Government and two years of a foreign language, or its equivalent.

111. HISTORY OF WESTERN CIVILIZATION TO 1517. 3 hours.

112. HISTORY OF WESTERN CIVILIZATION: 1517 TO 1815. 3 hours.

113. HISTORY OF WESTERN CIVILIZATION: 1815 TO THE PRESENT TIME. An introductory survey of European history. The Medieval background, the Renaissance, the rise of international rivalry, the World Wars and their aftermath. Open to freshmen. 3 hours.

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

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

213. HISTORY OF THE UNITED STATES: 1900 TO THE PRESENT. A study of the political, social and economic development of the United States from the colonial period to the present time. Open to freshmen. 3 hours.

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

321. ENGLISH HISTORY TO 1603. 3 hours.

322. ENGLISH HISTORY: 1603-1815. 3 hours.

323. ENGLISH HISTORY 1815 TO THE PRESENT TIME. The English people in their political, social and institutional development; the growth of the British Empire and evolution of the British Commonwealth of Nations. 3 hours.

324. RENAISSANCE. The political evolution of the Italian communes into city republics; early capitalism and industrial and commercial movements; the culture, art, science, and literature of the period and their influence upon the Church, the Papacy, and modern modes of thought and behavior. 3 hours.
325. Reformation. The Church and European society in the later Middle Ages; culture and thought in the age of the Reformation; the rise of the European state system; Luther and the beginning of the Reformation; Zwingli and Switzerland, Calvin, the expansion of Protestantism in Europe; the Counter Reformation; and the relation of the Reformation to medieval and modern civilization. 3 hours.

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

331-332-333. 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 isolationism. Prerequisite: History 211, 212, 213. 6 hours.

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

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

353. 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, and the growth of the cultural and political institutions of Latin America. The struggle for independence and the rise of the modern Latin American Republics. Prerequisite: Consent of 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 techniques 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 1914: imperialism; the alliance system; World War I; the Soviet Union and the fascist powers; relations with the Middle-East and the Far-East; World War II. Prerequisite: History 111, 112, 113. 9 hours.

377. **History of Africa.** (Sub-Saharan). From earliest times 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 the present; Indian relations, land policies, transportation and trade. 3 hours.

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

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

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

433. **Physical Geography.** World geography; 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.
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. Students are required to complete two years of a foreign language, or its equivalent.

201-202-203. AMERICAN FEDERALISM AND GOVERNMENT. The origin development, structure, and functions of national, state and local governments in the United States. Sophomore course. 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 American (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.
372. INTERNATIONAL ORGANIZATION. The principles of international organization. A comparative analysis of the objectives, structure, machinery, agencies, and procedures of the League of Nations, the United Nations. 3 hours.

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

384-385-386. 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 Marxist ideology, internal condition and foreign interference. Limited cooperation with Western Powers; Second World War and aftermath. 3 hours.

423. SOVIET SOCIAL AND ECONOMIC INSTITUTIONS. A study of the Soviet economic structure; general principles of private law, including family law; industrial and trade relations; labor law; and collective farms. 3 hours.

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 government and political behavior. Intensive study of a suitable program with a written and 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 BOWLING

The principal objective of the Department of Industrial Arts is to provide a basic education in applied arts and sciences through an understanding of manufacturing, production and consumption, utilizing a variety of materials, processes, operations and procedures.
In the course areas attention is directed toward researching, experimenting, inventing and creative art'stry, involving problem-solving situations derived from both theory and practice of the arts and sciences. The courses are organized to provide a basic professional-technical education for persons preparing to teach the arts of industry and technical subjects in the public schools.

This department offers several courses that are of interest and value to both men and women students concentrating in other fields. The recommended courses are: 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.
213. **Wood Technology.** First in a series of three courses devoted to woodworking; the nature of wood, and its present day applications; forestry, lumbering, grading, preserving, and utilization of wood products and by-products; the identification of common commercial lumbers, strength analysis, control of shrinkage, methods of preservation and beautification; wood fabrication and joining techniques. 3 hours.

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

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

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

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

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

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 Art; page 53)

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

322. **Printing.** An historical study of printing with typical exercises in composition, typography, imposition, principles of display, platen press, cylinder press operation and offset press operations. Prerequisite: Graphic Arts 331 or permission of the department chairman. 3 hours.
323-324. **Lapidary and Jewelry.** The fundamentals of the art of lapidary; working with natural and synthetic stones including the sawing, shaping, polishing and mounting of jewelry stones. 6 hours.

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. Visitation 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 automobiles through scientific methods of diagnoses. 5 hours.

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

470-480. **Student Teaching in Industrial Arts Education.** See Education 470-480. 12 hours.

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**MATHEMATICS**

(Department 123)

Assistant Professors Lhamon (Acting Chairman), Kuhns, Roiser; Instructors Evans, Frank, Taussig, Tayim, Vannorsdall; Lecturers Bauhof, Bowsher, Hayes, Silver, Sommers.

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

Career opportunities in mathematics are numerous. The supply of qualified mathematicians has not kept pace with the demand. A mathematics major may find teaching on either the secondary school level or college level an exciting and attractive goal. After a graduate degree a student may wish to meet the challenge of research in mathematics through industrial, educational or governmental institutions. The development of computer science has opened many
opportunities to mathematicians interested in computer programming and numerical analysis.

The Department offers a curriculum that is designed to serve the needs of the humanities, the technical background for the related sciences, and those who wish to pursue mathematics as a career.

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

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

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

Courses for a freshman are determined on the basis of the student's achievement in high school and on the college entrance examinations. Advanced placement of students is encouraged.

111-112-113. Fundamental Mathematics. Sets, relations, theory of arithmetic, systems of numeration, integers and real numbers, order relations, denseness and completeness; logic of Algebra, exponents, logarithms; trigonometric functions, introduction to analytic geometry and calculus. Prerequisite: One year of high school algebra. 9 hours.

151. Elementary Functions. Sets, numbers, basic theorems, extension of the logic of algebra, functions and their graphical representation, linear and quadratic functions, inverse functions, determinates, permutations, combinations, binomial theorem, mathematical induction, exponential and logarithmic functions, trigonometric functions, circular functions, complex numbers. Prerequisite: 2½ units of high school mathematics. 5 hours.
183. Elementary Statistics. Concepts and practices commonly used in statistical problems of business, economics, education, and social welfare; testing hypotheses and estimation, chi-square test, analyses of variance, mean, correlation, methods of sampling. Prerequisite: Mathematics 151. 3 hours.

191. Finite Mathematics. Compound statements, connectives, sets, partitions and counting, vectors and matrices, topics in finance, linear programming. Recommended for students in Business Administration, Economics, Biology and Social Sciences. Prerequisite: 2½ units of high school mathematics and/or high admission test scores. 5 hours.

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

241-242-243. Calculus and Analytical Geometry. This sequence is for students in the four year engineering program and for advanced placement of freshmen in the physical sciences. Content of Mathematics 152, 153, 251, and 252. Mathematics 243 should be followed by 341. 15 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. 20 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. Geometry as a branch of contemporary mathematics; Neutral, Lobachevskian and Riemannian geometries; comparisons with Euclidean geometry. Prerequisite: Mathematics 252 or 341. 4 hours.
320. History of Mathematics. The origin and growth of mathematical concepts, with emphasis on the development of ideas but with personal glimpses of some of the men who made major contributions. Prerequisite: Mathematics 351 or 341. 3 hours.


350. Linear Algebra. Vector spaces, linear mappings, linear equalities, matrices, linear inequalities, convex sets, inner product, determinates, quadratic forms, eigenvalues, computer applications. Prerequisite: Calculus. 3 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, the integers, fields, the rational numbers, the real numbers, the complex numbers, polynomials, groups, vector spaces, matrices, determinants. Prerequisite: Mathematics 252 or 341. 5 hours.

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 351. 6 hours.

MUSIC
(Department 114)

Professor Roeder (Chairman); Assistant Professors Sonntag, Weitz; Instructors Lasko, Doudna, Patton; Lecturer Plukker.

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

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

*Departmental Requirements:

**BACHELOR OF ARTS DEGREE**

<table>
<thead>
<tr>
<th>Major performance area</th>
<th>24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary performance area</td>
<td>12</td>
</tr>
<tr>
<td>Theory of Music</td>
<td>16</td>
</tr>
<tr>
<td>(Harmony, sight-singing, ear-training)</td>
<td></td>
</tr>
<tr>
<td>Counterpoint</td>
<td>3</td>
</tr>
<tr>
<td>Arranging (vocal or instrumental)</td>
<td>3</td>
</tr>
<tr>
<td>Historical Approach to Music Literature</td>
<td>9</td>
</tr>
<tr>
<td>Conducting (General conducting and techniques)</td>
<td>2</td>
</tr>
<tr>
<td>(Choral conducting and materials or instrumental conducting and materials)</td>
<td></td>
</tr>
<tr>
<td>Participation in a performing group</td>
<td>6</td>
</tr>
<tr>
<td>Senior recital</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75</strong></td>
</tr>
</tbody>
</table>

*Required courses in Education including Student Teaching are listed in the Department of Education section of this catalog.*
BACHELOR OF SCIENCE IN EDUCATION

Major performance area 12 hours
Secondary performance area 6
Theory of Music 16
   (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 (material 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.

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. INSTRUMENTAL ENSEMBLE—STAGE BAND. Selected ensemble of instrumental students for the study and performance of contemporary literature. 1 hour per quarter.

057. INSTRUMENTAL ENSEMBLE—WOODWINDS. Selected ensemble of woodwind instrumental students for the study and performance of suitable literature. 1 hour per quarter.

058. INSTRUMENTAL ENSEMBLE—BRASSES. Selected ensemble of brass instrumental students for the study and performance of suitable literature. 1 hour per quarter.

COURSES IN MUSIC

101-102-103. 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. 12 hours.

111. MUSIC FOR THE ELEMENTARY CLASSROOM TEACHER (Primary). Music activities, music materials, and literature, unit planning and teaching methods and skills for the elementary classroom teacher—grades 1-3 including kindergarten; the use of the auto-harp, melody instruments, records, and creativity. 3 hours.
112. **Music for the Elementary Classroom Teacher** (Intermediate). Music activities, music materials, and literature, unit planning and teaching methods and skills for the classroom teacher—grades 4-6. 3 hours.

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

211. **Theory 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. 4 hours.

212. **Counterpoint.** Development of technical facility for contrapuntal writing. 3 hours.

213. **Choral Arranging.** Development of technical facility for arranging music to be sung by choirs, glee clubs, and vocal organizations. 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). The study of music techniques, teaching procedures, and the use of materials in the primary grades; designed for music teachers and supervisors. 3 hours.

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

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

**High School.** 6 hours per quarter.

**PHILOSOPHY AND RELIGION**

(DEPARTMENT 115)

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

**Field of Concentration (Interdisciplinary major)**

A field of concentration of 45 hours, exclusive of the core course, 231-232-233, 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).

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.

**PHILOSOPHY**

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

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

235-236. **INTRODUCTION TO PHILOSOPHY.** A two quarter course initiating the student into the perennial problems of philosophy by means of firsthand acquaintance with the writings of philosophers through the ages. 6 hours.

331, 332, 333. **THE HISTORY OF WESTERN PHILOSOPHY.** 9 hours.

331. **THE CLASSICAL PERIOD OF GREEK AND ROMAN PHILOSOPHERS.**

332. **THE MEDIEVAL AND RENAISSANCE PERIODS.**

333. **THE MODERN PERIOD, INCLUDING ANALYTICAL, POSITIVIST AND EXISTENTIAL PHILOSOPHIES.** Prerequisite: A year of Philosophy, 231-232-233 or 234-235-236.

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

432. **AMERICAN PHILOSOPHY.** Reading and discussion of selected writings of modern American philosophers, including James, Dewey, Santayana, Whitehead and contemporary philosophers. Prerequisite: A year of Philosophy 231-232-233 or 234-235-236. 3 hours.
433. Philosophy of History. A study of the principles, methods and theories used by historians in their writing and interpretation of history. Prerequisite: A year of Philosophy 231-232-233 or 234-235-236. 3 hours.

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

Religion

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

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

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

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

254-255-256. Bible History. The history of the Hebrew and early Christian peoples of Old and New Testament times, with special reference to the scriptural record, and in relation to the cultural, political and religious influence of their Near East neighbors. The fall quarter traces this history from early times to the reign of Solomon; the winter quarter, from the period of the Divided Kingdom through the Exile and Restoration with special attention to the prophets; the spring quarter, from the Maccabean Period through the times in which Jesus lived and taught, the work and writings of St. Paul, the beginnings of the Early Church, and the writing and selection of the New Testament Scriptures. 9 hours.
351. **The Life and Letters of St. Paul.** The development of the early Church and the relation of St. Paul to this work as revealed in the Book of Acts and in the Letters of Paul. Prerequisite: One year of Religion. 3 hours.

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

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

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

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

359. **Churchmanship.** The Christian Church in modern life, its historical purpose and functions, organizations and agencies, activities, missionary outreach, the ecumenical movement, social concerns, etc. Prerequisite: As in 357. 3 hours.

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

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

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

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

(Department 143)

Professor Lamb, Associate Professor English (Chairman), Assistant Professors Roberson, Banks, Michael; Instructors, Ludwig, Kerr, Paimisano; Lecturer McCabria.

Some form of physical activity is required of all students (law excluded) during their first two years in the University. The nature and amount of work to be taken depends upon the physical condition as revealed by 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 a week. One credit each quarter for the first six quarters. Must be completed prior to senior status in Liberal Arts.

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

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

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

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


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

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

Professional Curriculum for Teachers

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

*101-102-103. Physical Education for Majors. (Men) Courses 101-103 are required of all students majoring or minoring in physical education in place of courses 001-003. Activities taught in season include speedball, touch football, games of low organization, tumbling, wrestling, trampoline, tennis, and ping pong. 1 hour each.

*104-105-106. 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. 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.

*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); the chemical characteristics of food, enzymes and metabolic end products; factors with 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.

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

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

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

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

*223. **Body Mechanics.** The general body mechanics of the human organism; the activities of the physical education program in their relation to coordination and the proper body mechanics. Prerequisite: Physiology and Anatomy 331 and 332. 3 hours.
**301-302-303. Principles, Methods, Organization and Administration of Physical Education. Lectures, demonstrations, and practice. Physical education and recreation from the standpoint of general education; the teaching of fundamental skills of tumbling and stunts, basketball, indoor baseball, speedball, volleyball, handball. Class, three hours; practice, two hours. 4 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, demonstration 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.

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

*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.

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.

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

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

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

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

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

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

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

**Physics**

(Department 124)

Professor Abele (Chairman); Assistant Professors Messick, Weimer; Instructor Roll.

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

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

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

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

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

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

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

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

These courses are for pre-medical, pre-dental, pre-pharmacy and secondary education students. (3 + 2) 211 should precede 212 and 213. Prerequisite: Mathematics 151, 152.

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

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

233. **Physics: Electricity and Magnetism.** 5 hours.

Courses for engineers and physical science majors. (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. Prerequisite: Physics 210 or equivalent. 3 hours.

302. **Electronics.** Electron ballistics, thermionic emission, vacuum tube and transistor characteristics, rectifiers, amplifiers, oscillators, modulators, demodulators, and electron tube and transistor instruments. (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.
Sociology and Psychology

(Department 133)
Professor Markle; Assistant Professors Crider (Acting Chairman), Cohoe, Gates; Instructor Hastings; Lecturers Crider, Zwerling.

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, in addition to the University and College of Liberal Arts requirements, must complete the following courses:

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td>111-2-3 General Biology</td>
<td>12</td>
</tr>
<tr>
<td>201-2-3 American Government</td>
<td>9</td>
</tr>
<tr>
<td>211 General Psychology</td>
<td>5</td>
</tr>
<tr>
<td>351 Social Psychology</td>
<td>5</td>
</tr>
<tr>
<td>201-2-3 Marriage and the Family</td>
<td>9</td>
</tr>
<tr>
<td>321 Criminology</td>
<td>5</td>
</tr>
<tr>
<td>323 Juvenile Delinquency</td>
<td>5</td>
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<tr>
<td>341 Introduction to Social Welfare</td>
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<td>342 Social Welfare Needs and Resources</td>
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<td>343 Social Work Methods</td>
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<td>441-442 Social Work Investigation</td>
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<td>443 Social Field Work Observation and Orientation</td>
<td>2.5</td>
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<tr>
<td>433 Human Growth and Development</td>
<td>3</td>
</tr>
<tr>
<td>444 Domestic Law</td>
<td>3</td>
</tr>
</tbody>
</table>
PSYCHOLOGY

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

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

332. Applied Psychology. The application of psychological principles to problems of modern life; clinical practice; personnel work; home life; education; industry; business law and criminology; medicine and social reform. Prerequisite: Psychology 211. 5 hours.

350. Social Statistics. An elementary introduction into the methods and uses of descriptive and inferential statistics in the Social Sciences, including measures of central tendency, variance, and differential analysis. Prerequisite: Mathematics 111, 112, 113; Psychology 211 or Sociology 241. 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 211. 5 hours.

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

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

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

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

424. Psychology of the Gifted Child. An analysis of the psychological problems of the gifted child. Prerequisite: Psychology 211. 3 hours.
431. **Introduction to Experimental Psychology.** An introduction to methods of experimental psychology including experimental methods, report writing, terminology, and relevant background materials. Prerequisite: Psychology 211 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 211. 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 211. 3 hours.

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

**Sociology**

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

202. **Marital Adjustment.** Factors in modern life affecting the stability of the family. A critical study of the biological, psychological, and social factors in marital adjustment. 3 hours.

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

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

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. 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 241. 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. **Archeology 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. 5 hours.

323. **Juvenile Delinquency.** Characteristics of delinquents, juvenile court procedures, correctional training in institutions, plans and programs for the prevention of delinquency. 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.** Introduction to the 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.** A study of the phenomena which arise when groups of people who differ racially or culturally come into contact with one another. Prerequisite: Sociology 241. 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 241. 5 hours.

421. **Public Opinion and Propaganda.** An analysis of the nature and sources of contemporary public opinion and the nature, extent, and direction of propaganda in contemporary society. 3 hours.
422. MARRIAGE AND FAMILY COUNSELING. Premarital and marital counseling; emphasis upon role playing in a counseling situation. Open only to students with the approval of the instructor. Prerequisite: Sociology 201-202. 5 hours.

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. 2-5 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.
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 State Board of Registration for Professional Engineers and Surveyors lists Ohio Northern University as a recognized engineering school.

PURPOSE

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

HISTORY

During the eighty-six 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 UNI-
VERSITY (see Index). Early application is advisable. Candidates of good moral character may apply for admission upon one of the following plans:

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

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

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

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

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

LOAD

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

STUDENT ACADEMIC STANDING

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

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

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

**CLASSIFICATION**

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

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

Courses, 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 University and departmental 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 400 level engineering courses for final credit toward graduation.

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

**REGISTRATION AS A PROFESSIONAL ENGINEER**

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

ENGINEERING BUILDING

The College of Engineering, staff, and faculty are housed in a three story, thirty-eight room brick structure. The building has drafting rooms, design rooms, classrooms and laboratories, including Testing Materials Laboratory, Fluid Mechanics Laboratory, Concrete Laboratory, Soils Laboratory, Steam Laboratory, Thermodynamics Laboratory, Instrumentation Laboratory, A.C. Power Laboratory, D.C. Power Laboratory, Surveying Supply, Senior Design Room, Machine Shop, Electronics 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 engineer needs an educational background in their use. The establishment of the Computer Center follows the current engineering trend to make equipment available to the undergraduate student.

A course which uses the Computer Center as a laboratory is available to 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.

PROFESSIONAL AND TECHNICAL ORGANIZATIONS

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 professional organization. Professional standards, professional registration, ethics and the engineer’s
place in the community are some of the things inculcated by the student branch of the Ohio Society of Professional Engineers, and the National Society of 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 affiliated 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 meetings. The student chapter enjoys a very close association with the Lima Section of the Institute of Electrical and Electronics Engineers.

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

**PRE-ENGINEERING CURRICULA**

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

**ARTS-ENGINEERING CURRICULA**

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

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

### FIRST YEAR

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<th>Course</th>
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<th>Spring</th>
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<td>112153</td>
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<td>123242</td>
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### SECOND YEAR

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<thead>
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<tr>
<td><strong>SECOND LEVEL (Rank 62)</strong></td>
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<td>*Engineering Math 1, 2, 3</td>
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<td>*Liberal Arts Major</td>
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R = Recitation, L = Laboratory, C = Credit Hours.
Catalog numbers followed by - (dash) indicate dependent courses and/or prerequisite relationship.
Catalog numbers followed by , (comma) indicate no dependence.
Student will work out 3 terms of Physical Education during the first three terms of school.
Orientation will be scheduled for each new student for the first year in the College of Engineering.
*Course sequences which must be completed in order to advance to the next rank classification.
### Basic Five Year Engineering Program

**Third Year**

<table>
<thead>
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<th>Course</th>
<th>Fall</th>
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<tbody>
<tr>
<td>Philosophy &amp; Religion</td>
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<td>Humanities</td>
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<tr>
<td>*Liberal Arts Major</td>
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<td>*Engineering Graphics 1, 2, Thermo 1</td>
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<td>*Engineering Mechanics 1, 2, 3</td>
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<td>*Passive &amp; Active Circuits 1, 2, 3</td>
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<tr>
<td>*Intro. To Engr. Lab, Circuits Lab 1, 2</td>
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| Total                                     | 16 4 18 | 15 7 18 | 18 3 19 |

**Surveying Camp for Civils**

*Surveying I* 202200 (Post-Spring) (12 Successive Days) 5 hours

**Fourth Year**

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<th>Course</th>
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**Fifth Year**

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<tbody>
<tr>
<td>400 Level Engineering Courses Depending</td>
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<td>R L C</td>
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<td>on Department plus L. A. Major</td>
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*Course sequences which must be completed in order to advance to the next rank classification.*
### BASIC FOUR YEAR ENGINEERING PROGRAM

#### FIRST YEAR

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<tr>
<td>*Engineering Reports, Physics 1, 3</td>
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<td>4 2 5</td>
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<tr>
<td>*Digital Computer 1, 2</td>
<td>201101 - 201102</td>
<td>2 1 2</td>
<td>1 2 2</td>
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<tr>
<td>*Engineering Graphics 1, 2</td>
<td>201201 - 201202</td>
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<tr>
<td>Social Science</td>
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<td><strong>Total</strong></td>
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</table>

#### SURVEYING CAMP FOR CIVILS

*Surveying 1*

<table>
<thead>
<tr>
<th>Course</th>
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<th>Spring</th>
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<tbody>
<tr>
<td>Surveying 1</td>
<td>202200 (Post-Spring)</td>
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(12 Successive Days) 5 hours

#### SECOND YEAR

<table>
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<tr>
<th>Course</th>
<th>Fall</th>
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<th>Spring</th>
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<tr>
<td>THIRD LEVEL (Rank 34)</td>
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<td>124232 - 122131 - 122132</td>
<td>4 2 5</td>
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<td>*D.E. 1 &amp; Calculus, D.E. 2, Vect. &amp; Comp. Calc.</td>
<td>123341 - 123352 - 123353</td>
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<tr>
<td>*Passive &amp; Active Circuits 1, 2, 3</td>
<td>201221 - 201222 - 201223</td>
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<tr>
<td>*Intro. To Engr. Lab, Circuits Lab 1, 2 Speech, *Thermodynamics 1</td>
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<td><strong>Total</strong></td>
<td>16 2 17</td>
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**R** = Recitation, **L** = Laboratory, **C** = Credit Hours.
Catalog numbers followed by - (dash) indicate dependent courses.
Catalog numbers followed by , (comma) indicate no dependence.
Student will work out 3 terms of Physical Education during the first three terms of school.
Orientation will be scheduled by each new student for the first year in the College of Engineering.
*Course sequences which must be completed in order to advance to the next rank classification.
## BASIC FIVE YEAR ENGINEERING PROGRAM

### FIRST YEAR

**FIRST LEVEL (Rank 15)**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Fall</th>
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<tr>
<td>English Composition 1, 2, 3</td>
<td>112151 - 112152 - 112153</td>
<td>R 3</td>
<td>L 0</td>
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**SURVEYING CAMP FOR CIVILS**

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### SECOND YEAR

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### THIRD YEAR

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

**All footnotes on Page 129 apply to this page as explanation and requirements.
BASIC COURSES

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

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

BASIC ENGINEERING

(Department 201)

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

100. Pre-ENGINEERING MATHEMATICS REFRESHER. (For Beginning Four-Year Students) (Pre-Fall.) For a period of three weeks, five days per week, eight hours per day, a review of those portions of high school mathematics that are necessary to start college mathematics is offered previous to the opening of the fall quarter. All first year students 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.

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


NOTE: (1+0) indicates the student contact hours per week. The first number gives the lecture hours while the second, shows the laboratory hours.
102. Digital Computation 2 (1+1). Prerequisite: 101. 2 hours. Continuation of 101.

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.

201. Engineering Graphics 1 (0+4). Lettering, use of instruments, applied geometry, orthographic projection, sketching, pictorial sketching, dimensioning. Prerequisite: None. 2 hours.

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

211. 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 234-53, Physics 231. 3 hours.

212. 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: 211. 3 hours.

213. 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: 212. 3 hours.

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

222. 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: 221. 3 hours.

223. Passive and Active Circuits 3 (3+0). Magnetically coupled circuits, introduction to network topology, polyphase circuits and Fourier analysis. Prerequisite: 222. 3 hours.
231. **Introduction to Engineering Laboratory (1+0)**. A rational approach to the planning, operation and interpretation of experiments; propagation of errors in instrument systems; dimensional analysis; sequence and spacing of runs; analysis, rejection criteria and reduction of data. Prerequisite: Math 243-53, Physics 233. 1 hour.

232. **Circuits Laboratory 1 (0+3)**. A laboratory study of electric circuits. Prerequisite: 222 concurrently, 231. 1 hour.

233. **Circuits Laboratory 2 (0+3)**. Continuation of 232. Prerequisite: 223 concurrently, 232. 1 hour.


321. **Thermodynamics 2 (3+0)**. Relations among thermodynamic properties, mixtures, chemical reactions and equilibrium. Prerequisite: 243. 3 hours.

322. **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: 212. 3 hours.

**Civil Engineering Department**

Professors Keyser, McNabb; Associate Professor Milks (Acting Chairman); Assistant Professor Wu

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

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

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.
FOUR YEAR PROGRAM—CIVIL ENGINEERING

(See page 128-9 For First and Second Year and Notation)

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*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 P & R and Humanities will have already been completed. Corresponding ranks are 45 and 55, respectively.
CIVIL ENGINEERING

(DEPARTMENT 202)

200. Surveying 1 (3+6). (Surveying Camp). Use of various tapes, level, and transit; differential and profile leveling; traversing; earthwork calculations; presence and magnitude of errors; the application of surveying methods of land, city, and topographic surveys. Prerequisite: 201202. 5 hours.

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

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

312. Structural Analysis 1 (3+3). Superposition, elastic-energy expressions, deflection analysis, real work, differential equations of elastic curve method, auxiliary load method, and application of these methods to the method of consistent distortion to solve statically indeterminate structures. Prerequisite: 301, 311. 4 hours.

313. Structural Analysis 2 (3+3). Application of action and displacement methods using the method of consistent distortion to evaluate indeterminate structures. Prerequisite: 312. 4 hours.

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

331. Surveying 2 (3+6). Theory and practice in horizontal and vertical curves as applied to the location and design of highways, railroads, and other routes of transportation, with special emphasis on highway geometries. Procedures and problems encountered in high-order control surveys for bridges, dams, tunnels, and other large construction projects. Prerequisite: 200. 5 hours.

332. Photogrammetry (2+3). The use of aerial photography in different phases of engineering such as transportation, surveying, etc; air photo interpretation; study of devices used in photogrammetry; analytic solution of tilt and rectification problems; and controlled mosaics. Prerequisite: 331. 3 hours.
333. **Transportation Engineering (3+3).** A study of transportation systems covering the areas of geometric design, location, development, prediction for future demands, finance, and economics. Prerequisite: 332. 4 hours.

341. **Engineering Mechanics Laboratory 1 (0+3).** Experimental verification of fundamental theories of mechanics of materials; advanced instrumentation. Introduction of techniques of model analysis. Prerequisite: 201213, 301 concurrently. 1 hour.

342. **Engineering Mechanics Laboratory 2 (0+3).** Verification of fundamental principles covered in Fluid Mechanics and Hydraulics. Calibration of hydraulic measuring devices; measurement of pipe friction; flow in open channels; and efficiency tests of centrifugal pumps. Prerequisite: 201322, 341 concurrently. 1 hour.

352. **Materials Science (2+3).** Theory and practice in the design of concrete mixes. A study of the physical and chemical properties of cements and aggregates, brick, block, tile, and stone. Use of admixtures in concrete and natural destructive agents. Laboratory study of the methods of design of bituminous concrete mixes as applied to airport runways and highways and the study of the physical and chemical properties of constituent materials. Prerequisite: Chemistry 132, 301. 3 hours.

353. **Engineering Geology (3+0).** Study of minerals and rocks; physical, historical and structural geology; geological forms; land formations; planning of soil surveys. Techniques of air photo interpretation in identifying the engineering properties of soil: surface and subsurface geological maps. Field trip. Prerequisites: Chemistry 132, 200, or by special permission. 3 hours.

411. **Sanitary Engineering 1 (3+0).** Development of sources of water supply; determination of quantity of storm water; design of water distribution systems; design of storm water sewers; design of sanitary sewers; hydraulic design of water and sewage treatment plants. Prerequisite: Chemistry 132, 323. 3 hours.

412. **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: 411. 3 hours.

413. **Construction Methods (2+3).** Specifications, economical construction methods, quantity take-offs, cost analysis, and cost estimating as applied to various engineering projects. Prerequisite: 421, 441. 3 hours.
421. REINFORCED CONCRETE 1 (3+3). Elastic design and ultimate strength of structural elements; beams in bending, bond, shear; diagonal tension in beams, axially loaded columns, and eccentrically loaded columns; and application of codes and specifications to design. Prerequisites: 313, 352. 4 hours.

422. REINFORCED CONCRETE 2 (3+3). Retaining walls, footings, two-way and flat slabs, and thin shell roofs. Design of concrete buildings and bridges. Prerequisite: 421. 4 hours.

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

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

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

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

441. STRUCTURAL DESIGN 1 (2+6). The design of beams, columns, beam columns, built-up members, and connections. Use of influence lines and various other techniques for determining maximum loadings. Prerequisite: 313. 4 hours.

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

443. ADVANCED STRUCTURAL MECHANICS (3+0). Theory of elasticity, structural stability, plates and shells, and vibrations. Prerequisite: 442. 3 hours.

490. CIVIL ENGINEERING PROJECT; OR, SPECIAL PROBLEMS; OR, ADVANCED TRANSPORTATION ENGINEERING; OR, ADVANCED SANITARY ENGINEERING; OR HYDROLOGY AND HYDRAULIC ENGINEERING (2+3). Practical projects involving calculation, design, drafting, and engineering judgment. Prerequisite: rank 54 or
55; OR, special problems, Prerequisite: Last Quarter of rank 54 or 55; OR, topics in highway, railroad, water, and air transportation, Prerequisite: 333, 432; OR, the application of engineering principles toward the control of the environment for the protection and improvement of the health and comfort of man, including the design of water and sewage treatment plants and the reduction of air pollution, Prerequisite: 411, 412; OR, elementary treatment of major topics in hydrology, including rainfall, evaporation groundwater and runoff. Treatment of advanced problems in river mechanics including flood routing, channel improvement, and spillway and reservoir design, Prerequisite: 323. 3 hours.

**ELECTRICAL ENGINEERING DEPARTMENT**

**Professor Klingenerberger (Chairman); Associate Professor Carmean; Assistant Professors Johansen, Stahl; Mr. Busch**

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

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

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

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.
### FOUR YEAR PROGRAM—ELECTRICAL ENGINEERING

(See Pages 128-9 For First and Second Year and Notation)

#### THIRD YEAR

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</tbody>
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*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 P & R and Humanities will have already been completed. Corresponding ranks are 45 and 55, respectively.*
ELECTRICAL ENGINEERING

(DEPARTMENT 203)

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

311. Electronics 1 (3+0). Operating principles of electronic devices; models representing these devices. Prerequisite: 201223. 3 hours.

312. Electronics 2 (3+0). Small signal amplifiers; feedback; audio-frequency and radio-frequency amplifiers with large signals. Prerequisite: 311. 3 hours.

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

331. Fields and Waves 1 (4+0). Electrical phenomena from the viewpoint of field theory. Vector analysis used throughout. Prerequisite: 201223, Math 353. 4 hours.

332. Fields and Waves 2 (4+0). Continuation of 331. Prerequisite: 331. 4 hours.

333. 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: 332. 4 hours.

342. Transient Analysis (4+0). Application of Laplace Transform methods to transient phenomena in linear electrical and mechanical systems. Prerequisite: 201223, Math 353. 4 hours.

343. Control Systems 1 (3+0). A course in closed-loop systems performance from equations and transfer-function plots. Prerequisite: 342. 3 hours.

351. Electrical Engineering Laboratory 1 (0+3). A laboratory study of active devices and their associated circuits. Prerequisite: 311 concurrently. 1 hour.

352. Electrical Engineering Laboratory 2 (0+3). Continuation of 351. Prerequisite: 312 concurrently, 351. 1 hour.

353. Electrical Engineering Laboratory 3 (0+3). Continuation of 352 and introduction to microwave generators, detectors, waveguides, waveguide components and microwave measurements. Prerequisite: 313 and 333 concurrently. 1 hour.
363. **ANALOG COMPUTER LABORATORY (0+3).** Introduction to analog computer programming. Prerequisite: 342. 1 hour.

411. **ELECTRONICS 4 (3+0).** Wave generation and shaping. The study of timing, switching, logic, and memory circuits. Prerequisite: 311, 342. 3 hours.

412. **ELECTRONICS 5 (3+0).** Electronics power conversion circuits and devices. Power control and regulator circuits; power supply filters. Prerequisite: 411. 3 hours.

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

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

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

431. **ENERGY CONVERSION 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: 342. 3 hours.

432. **ENERGY CONVERSION 2 (3+0).** Steady state and transient analysis of transformers, direct-current machines, synchronous machines and induction machines. Prerequisite: 431. 3 hours.

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

441. **CONTROL SYSTEMS 2 (3+0).** Control system design using root locus and frequency response methods. Prerequisite: 343. 3 hours.

451. **ELECTRICAL ENGINEERING LABORATORY 4 (0+3).** Continuation of 353 and electronic wave shaping and switching circuits. Prerequisite: 353, 411 concurrently. 1 hour.

452. **ELECTRICAL ENGINEERING LABORATORY 6 (0+3).** Continuation of 451 and power electronics application. Prerequisite: 451, 412 concurrently. 1 hour.
453. Electrical Engineering Laboratory 8 (0+3). Laboratory study of nonlinear systems utilizing analog and digital computer techniques. Prerequisite: 422, 452, 423 concurrently. 1 hour.

461. Electrical Engineering Laboratory 5 (0+3). Laboratory study of automatic control systems. Prerequisite: 353, 441 concurrently. 1 hour.

462. Electrical Engineering Laboratory 7 (0+3). Study of the generalized machine and other DC, synchronous, and induction machines. Prerequisite: 461, 432 concurrently. 1 hour.

463. Electrical Engineering Laboratory 9 (0+3). Continuation of 462 and a laboratory study of non-electromechanical energy conversion devices. Prerequisite: 433 concurrently. 1 hour.

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

Mechanical Engineering Department

Professor Horldt; Associate Professor Burton (Chairman); Assistant Professors Farrington, Whisler

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

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

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

(DEPARTMENT 204)


312. MATERIALS 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: 311. 2 hours.

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

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

331. MECHANICAL ENGINEERING LABORATORY 1 (0+6). 2 hours.

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

333. MECHANICAL ENGINEERING LABORATORY 3 (0+6). 2 hours. Fundamental mechanical laboratory sequence: specific experiments involving measurements, instrumentation, calibration, and analysis of experimental accuracies. Concurrent small-team investigative projects of timely interest. Prerequisite: Rank 44 or 45.

341. KINEMATICS (3+3). The study of mechanisms and their motion: acceleration, velocity, and displacement of machine elements (gears, cams, etc). Prerequisite: 201212. 4 hours.

342. ADVANCED THERMODYNAMICS (3+0). Study in depth of the more important power and refrigeration devices and systems. Introduction to special non-equilibrium topics. Prerequisite: 201321. 3 hours.
FOUR YEAR PROGRAM—MECHANICAL ENGINEERING

(See Page 128-9 For First and Second Year and Notation)

THIRD YEAR
FOURTH LEVEL (Rank 44)

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<th>Course</th>
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<td>*Kinematics, Adv. Thermo., Heat Trans. 1</td>
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| Total | 14 | 9   | 17  | 15 | 6   | 17  | 12 | 13 | 17 |

FOURTH YEAR
FIFTH LEVEL (Rank 54)

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<td>Num. Anal., Thermal Syst. Anal. 1, 2</td>
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</table>

*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 P & R and Humanities will have already been completed. Corresponding ranks are 45 and 55, respectively.
343. 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, 201322. 3 hours.

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

411. Mechanical Design 1 (3+3). 4 hours.

412. Mechanical Design 2 (3+3). 4 hours.
Sequence of design of machine elements: analytical study of shafts, bearings, gears, fasteners, clutches, couplings, etc., and preparation and execution of drawings according to professional standards. Prerequisites: 202301, 313, 341.

413. Mechanical Design 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: 412. 4 hours.

421. Numerical Analysis (3+0). Application of numerical methods to the solution of engineering problems. Prerequisite: Math 353. 3 hours.

422. Thermal System Analysis 1 (2+0). 2 hours.

423. Thermal System Analysis 2 (4+0). 4 hours.
Integration of the fundamental (and repetitive) thermal aspects of the traditional fields of internal combustion engines, steam power stations, environmental control and turbomachines with emphasis on the system analysis approach and simulation techniques. Prerequisite: 203323, 342, 343.

431. Mechanical Engineering Laboratory 4 (0+6). 2 hours.

432. Mechanical Engineering Laboratory 5 (0+6). 2 hours.
433. **MECHANICAL ENGINEERING LABORATORY 6 (0+6). 2 hours.**
Applied mechanical laboratory sequence: specific performance tests of engines, fluid handling devices, environmental condition-apparatus, etc. Concurrent investigative projects of individual interest and nature. Stresses development of the art of communication in reporting laboratory work. Prerequisite: 333.

441. **HEAT TRANSFER 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: 343. 3 hours.

442. **ADVANCED DYNAMICS (3+0).** Special topics in the area of mechanical vibrations and advanced dynamics. Prerequisites: 201212, 203342. 3 hours.

443. **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: 202301. 3 hours.

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

DR. LEROY D. BELTZ, Dean

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

FACULTY OF THE COLLEGE OF PHARMACY

FACULTY:

*LEROY D. BELTZ, Ph.D., Dean, College of Pharmacy, Professor of Pharmacy
*ALBERT T. AWAD, Ph.D., Associate Professor of Pharmacognosy; Chairman, Dept. of Pharmacognosy
*ROBERT P. FISCHER, Pharm.D., Sc.D., Dean Emeritus
*WALTER FRAZIER, Ph.B., Professorial Lecturer in Hospital Pharmacy
*CHARLES O. LEE, Ph.D., Professor of Pharmacy

MORTON L. MALLIN, Ph.D., Associate Professor of Microbiology; Chairman, Department of Microbiology

ROBERT L. MOFFITT, Ph.D., Professor of Pharmacology; Chairman, Department of Pharmacology

*ALBERT C. SMITH, Ph.D., Professor of Pharmaceutical Chemistry; Chairman, Department of Pharmaceutical Chemistry
*DANIEL M. STUART, Ph.D., Professor of Pharmaceutical Chemistry

* Registered Pharmacist
** Part-time
AIMS AND OBJECTIVES

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

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

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

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

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

REQUIREMENTS FOR ADMISSION TO PRE-PROFESSIONAL EDUCATION

Students entering the pre-professional pharmacy program should have four years of English; two and one-half years of mathematics (algebra and plane geometry, algebra II and/or trig.), but priority will be given to students with additional credit; two to three years of science (biology, general science, and

* Registered Pharmacist
chemistry or physics or both). Priority will be given to students with four years of science subjects.

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

Further information may be obtained from the College of Pharmacy.

REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF PHARMACY

1. To enter the College of Pharmacy an applicant must furnish to the committee on admissions of the College of Pharmacy proof of satisfactory completion of not less than 90 quarter hours, or 60 semester hours, with an accumulative grade point average of 2.0 ("C" average). Further, the applicant must complete the requirements (or their equivalent) listed in the Pharmacy Pre-Professional Program, which includes the English Proficiency Test.

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

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

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

Students who are entitled to advanced standing may enter at the time approved by the Dean. All pharmacy courses in the Pre-professional Program must be completed before the student is permitted to enter the second year of the Professional Program.

3. Scholarship Rating and Probation. Good academic standing requires a 2.0 (C) average. A student falling below this is placed on warning at the first occurrence. If he falls below a 2.0 average the following or any subsequent
quarter he will be placed on probation. A student on probation who fails to
meet the terms of his probation is subject to suspension or dismissal.
A student on probation is subject to any restrictions in extracurricular
activities placed upon him by the scholarship committee of the College of
Pharmacy.
No student will be allowed to proceed from one professional year to the
next unless the professional accumulative point average and the overall accumu-
lative point averages (including both professional and non-professional courses)
are 2.0 or better in required subjects and approved elective subjects.

REQUIREMENTS FOR GRADUATION
Each candidate for a degree:
1. Must successfully pass an English Proficiency test.
2. Must be of good moral character.
3. Must have completed not less than 240* quarter hours of acceptable
course work and 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 on Pharmaceutical Education.
5. Must meet such other qualifications as the faculty may determine.

QUALIFICATIONS FOR EXAMINATION
AND REGISTRATION AS A
PHARMACIST
Every Applicant shall:
1. Be a citizen of the United States, or shall have made application therefor;
2. Be not less than twenty-one years of age;
3. Be of good moral character and habits;
4. Be a graduate from a school or college of pharmacy or a department
of pharmacy of a university recognized and approved by the State
Board of Pharmacy.
5. File proof to the Board, substantiated by proper affidavits, of a minimum
of one year’s internship under the personal supervision of a registered
pharmacist, operating under the preceptor program of the Board. Credit

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

**LIBRARY**

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

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

**ORGANIZATION OF COURSES**

The present minimum educational requirement for admission to the practice of pharmacy in the various states consists of five years of study at the college level. At Ohio Northern University this five year program is presently divided into two major sections, the pharmacy-liberal arts section (PP-1 and PP-2) which is covered in the first two years at the College of Liberal Arts and the professional section (P3, P4 and P5) which is covered in the final three years in the College of Pharmacy.

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

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

The Department of Pharmacology offers courses of study in pharmacology and toxicology and in undergraduate pharmacological research.

The Department of Pharmacognosy offers an introductory and two basic courses which cover the study of official and important unofficial drugs of biological origin from various aspects. Five other elective courses, including a research problems course are designed for those students who contemplate graduate study in the area of pharmacognosy.

The Department of Pharmacy Administration offers courses in Pharmacy Law, Pharmaceutical Marketing and Pharmacy Management.

The Department of Microbiology offers basic courses in microbiology for students majoring in pharmacy and liberal arts. Public Health is also offered to pharmacy majors. There are a number of electives offered in the department. These electives include parasitology, virology, clinical pathology and research problems in microbial physiology and allied areas. In addition to courses offered by the department to students enrolled at Ohio Northern University, a course in medical microbiology is offered on campus to students of nursing enrolled at Lima Memorial Hospital.

THE FIVE YEAR PHARMACY PROGRAM

PRE-PROFESSIONAL PROGRAM

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<td>Mathematics 151</td>
<td>Mathematics 192</td>
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<td>(Introductory Calculus)</td>
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Total Credit Hours: 17  
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*Logic 234, Philosophy 235-236, & Bible History 254-255-256 may be substituted for the Philosophy and Religion sequence.

**Transfer students who are deficient in these courses will be able to incorporate them later in the professional program.

### PROFESSIONAL PROGRAM

### THIRD YEAR (P-3)

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<th>Fall</th>
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<td>Prescription</td>
<td>Practice 501</td>
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<td>Pharmacy Law</td>
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<td>Marketing 553</td>
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<td>Public Health 502</td>
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<td>Seminar 540</td>
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<td>Total Credit Hours</td>
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*Students must accumulate a minimum of 24 elective hours, in addition to the above listed required hours, to meet the graduation requirement of 250 total hours.

**RECOMMENDED ELECTIVES**

**COLLEGE OF LIBERAL ARTS**

- Biology 301-303, Vertebrate Anatomy and Embryology
- Chemistry 341-343, Physical Chemistry
- Chemistry 363, Advanced Organic
- Economics 322-323, Business Law
- Economics 333, Quality Control
- Economics 363, Personnel Management
- Economics 371, Salesmanship
- Economics 373, Transportation
- English 201-203, Introduction to English Literature
- English 211-213, Introduction to American Literature
- English 301-302, The British Novel
- English 303, Twentieth Century American Novel
- Foreign Languages
- History 111-113, Western Civilization
- History 211-213, History of the United States
- Music 200, The Study of Music
- Music 351-353, History of Music
- Philosophy and Religion 351, The Life and Letters of St. Paul
- Philosophy and Religion 352-353, Church History
- Political Science 201-203, American Government
- Psychology 211, General Psychology
- Psychology 311, Psychology of Personality
- Psychology 332, Applied Psychology
- Sociology 201, Courtship and Marriage
- Sociology 202, Marital Adjustment
Sociology 203, Family Relationships  
Sociology 331, The Culture of Early Man  
Sociology 341, Introduction to Social Welfare  
Sociology 342, Social Welfare Needs and Resources  
Sociology 343, Social Work Methods  
Education (for those wishing to obtain a teachers certificate)

COLLEGE OF PHARMACY
Pharmacy 420, Inorganic Pharmaceuticals  
Pharmacy 510, Pharmacy Cosmetics  
Pharmacy 511, Veterinary Pharmacy  
Pharmacy 530, Manufacturing Pharmacy  
Pharmacy 550, Pharmacy Problems  
Pharmacy 570, Advanced Hospital Pharmacy  
Pharmaceutical Chemistry 531, Instrumental Analysis  
Pharmaceutical Chemistry 540, Qualitative Organic Tests  
Pharmaceutical Chemistry 550, Chemistry Problems  
Pharmacology 550, Pharmacological Problems  
Pharmacognosy 441, Medicinal Plant Propagation and Cultivation  
Pharmacognosy 541, The Organic Constituents of Medicinal Higher Plants  
Pharmacognosy 542, Biogenesis of Natural Products  
Pharmacognosy 543, Advanced Microscopy  
Pharmacognosy 550, Pharmacognosy Problems  
Microbiology 461, Parasitology  
Microbiology 462, Virology  
Microbiology 463, Clinical Pathology & Hematology  
Microbiology 550, Undergraduate Research in Microbiology
DESCRIPTION OF COURSES

PRE-PROFESSIONAL PROGRAM

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

DESCRIPTION OF COURSES

PROFESSIONAL PROGRAM

DEPARTMENT OF PHARMACY

(Department 301)

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

101 and 102. PHARMACY ORIENTATION (1+0). These courses follow the orientation course in the Liberal Arts College and are designed to introduce the student to the educational and legal requirements of pharmacy, its organizations, and the areas of service available to those who are properly qualified. 1 hour.

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. Prerequisite: Chemistry 143.

311. PHARMACEUTICAL PREPARATIONS (3+3). The manufacture of official solutions, suspensions, and other liquid preparations; the chemistry and/or the physics involved in making these products, and the correct procedures to be used in manufacturing, packaging and labeling. Prerequisite: Pharmacy 211. 4 hours

312. PHARMACEUTICAL PREPARATIONS (3+3). A continuation of course 311; the manufacture of solid and semi-solid preparations, such as ointments, pastes, tablets, capsules and related products. Prerequisite: Pharmacy 311. 4 hours

333. PHYSICAL PHARMACY (3+3). The properties and technology of pharmaceutical systems and the fundamentals underlying the formulation, compounding, and stabilization of medicinal products are stressed. The laboratory enables the students to correlate the principles and equations with experimental observations. Prerequisite. Pharmacy 312. 4 hours.
421. **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.
Prerequisites: Pharmacy 333, Pharm. Chem. 462, Pharmacology and Toxicology 433. 4 hours.

540. **Pharmacy Seminar** (3+0). Current problems of pharmacy; factual analyses, panel discussions. The current literature of pharmacy will be reviewed from the standpoint, adequacy and reliability for professional guidance. 3 hours.

**ELECTIVE COURSE DESCRIPTIONS FOR THE DEPARTMENT OF PHARMACY**

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

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

511. **Veterinary Pharmacy** (2+0). Primarily designed to acquaint the pharmacy student with 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. Prerequisites: Consent of instructor. 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: Physical Pharmacy 333 and departmental approval. 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)

331. **Inorganic Medicinal Chemistry** (3+0). Modern concepts and theories are discussed. Methods of preparation, chemical tests, medicinal properties and doses are evaluated. Prerequisites: Chemistry 143 or its equivalent. *3 hours.*

332. **Pharmaceutical Analysis** (2+6). Gravimetric and volumetric analysis of chemicals, pharmaceuticals and crude drugs. Laboratory exercises emphasize analytical procedures, chemical control methods and some qualitative tests. Prerequisites: Chemistry 143 and 233. *4 hours.*

353. **Introductory Instrumental Analysis** (3+3). Instruments used in qualitative, quantitative and control analysis. Prerequisites: Pharmaceutical Chemistry 332. *4 hours.*

321. **Biochemistry** (3+3). This course covers the chemistry of carbohydrates, fats, proteins, nucleic acids and enzymes and the metabolism of carbohydrates. Prerequisite: Chemistry 233. *4 hours.*


461. **Chemistry of Organic Medicinal Products** (3+0). The structural relationships and chemical properties of medicinal products of natural and synthetic origin. Prerequisites: Chemistry 233. Pharmaceutical Chemistry 353. *3 hours.*


ELECTIVE COURSE DESCRIPTIONS FOR THE DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

531. Instrumental Analysis (2+3 or 2+6). Theories and the mathematics of instrumental procedures, U.S.P. and N.F. procedures. Prerequisites: Pharmaceutical Chemistry 353. 3-4 hours.

540. Qualitative Organic Tests (1+3). Lectures and laboratory combined to demonstrate the test for identification of organic drugs and chemicals, especially those official in the U.S.P. and N.F. Legal tests are also studied. Prerequisites: Pharmaceutical Chemistry 462. 2 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. Prerequisites: Departmental approval. 1-3 hours.

DEPARTMENT OF PHARMACOLOGY

(Department 303)

431. Pharmacology and Toxicology 1 (5+3). First of a three course sequence on pharmacology and toxicology. The three-course sequence consists of principles of pharmacology and toxicology; pharmacodynamics and therapeutic uses of drugs; toxic actions of drugs and poisons, and treatment of toxication. Offered in the fall quarter. Prerequisites: Biology 333, Pharmaceutical Chemistry 342, and Mathematics 193. 6 hours.

432. Pharmacology and Toxicology 2 (4+3). Second course of sequence. Offered in the winter quarter. Prerequisite: Pharmacology 431. 5 hours.

433. Pharmacology and Toxicology 3 (4+3). Final course of sequence. Offered in the spring quarter. Prerequisite: Pharmacology 432. 5 hours.

ELECTIVE COURSE DESCRIPTION FOR THE DEPARTMENT OF PHARMACOLOGY

550. Pharmacological Problems (0+3, 0+6, or 0+9). Principles of pharmacological research: literature pertinent to a specific problem, design and conduct of experiments to solve the problem, analysis of the resultant data, and preparation of a written report of the work. Offered in the fall, winter, and spring quarters. Prerequisites: Pharmacology 431 and departmental approval. 1-3 hours.
DEPARTMENT OF PHARMACOGNOSY

(DEPARTMENT 304)

421. INTRODUCTION OF PHARMACOGNOSY (1+3). An orientation in the field of Pharmacognosy: history, geographical distribution, cultivation, collection, preparation, commerce, identification, evaluation and therapeutic uses of the official pharmacognostical drugs. Methods of classifying drugs, the chemical system of classification. 2 hours.

422. PHARMACOGNOSY (3+3). The origin, biosynthesis, chemical and physical properties and the principle uses of drugs and pharmaceutical necessities obtained from plant and animal sources. Prerequisites: Pharmacognosy 421, Biochemistry 321-322, Microbiology 401. 4 hours.

423. PHARMACOGNOSY (3+3). A continuation of Pharmacognosy 422. Prerequisite: Pharmacognosy 422. 4 hours.

ELECTIVE COURSE DESCRIPTIONS FOR THE DEPARTMENT OF PHARMACOGNOSY

441. MEDICINAL PLANT PROPAGATION AND CULTIVATION (1+3). Propagation, cultivation, harvesting and preservation of medicinal plants. Planning and development of a medicinal plant garden. Prerequisite: Departmental approval. 2 hours.

541. THE ORGANIC CONSTITUENTS OF MEDICINAL HIGHER PLANTS (3+0). Chemistry and interrelationship of constituents obtained from pharmacognostical plants; methods of isolation, purification, identification; methods for 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.

543. ADVANCED MICROSCOPY (1+6). Application of 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, or 0+9). Principles of pharmacognosy 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: Fifth year standing and departmental approval. 1-3 hours.
DEPARTMENT OF PHARMACY ADMINISTRATION

(Department 305)

551. Pharmacy Law (4+0). Certain principles of law and ethics as applied to federal, state and local acts, regulations and practices encountered in the course of professional duties. Specific attention given to 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 selection, location, and management of pharmacies, their personnel, stock and equipment. 4 hours.

DEPARTMENT OF MICROBIOLOGY

(Department 306)

103. Medical Microbiology (3+2). Fundamentals of general and medical microbiology. Aspects of infectious diseases, diagnosis, and treatment. Enrollment limited to students of nursing. Prerequisites: Elementary Biology and Chemistry. 4 hours.

361, 362. Microbiology I, II (3+3). Fundamentals of 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 (one year of either type). 4 hours.

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

461. PARASITOLOGY (2+0). The principle protozoan, arthropodal, and helminthic infestations of man and domestic animals. Prerequisites: Microbiology 361, 362; Biochemistry 431, 432 or 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. Prerequisites: Biochemistry 431, 432; Microbiology 361, 362 and consent of instructor. 2 hours.

463. CLINICAL PATHOLOGY AND HEMATOLOGY (1+3). Routine diagnostic tests performed in hospital laboratories. Selected tests involving blood chemistry, serology, and urinalysis will be performed. Prerequisites: Microbiology, Biochemistry, or consent of instructor. 2 hours.

550. UNDERGRADUATE RESEARCH IN MICROBIOLOGY. Documentation, manipulative, and intellectual skills of investigation in the biologic science areas of interest in pharmacy. Prerequisite: The introductory course in the area of Microbiology, and consent of the instructor concerned. 1-3 hours.

SPECIAL NOTICE

As stated earlier, the pharmacy curriculum, because of rapid developments in the medical and allied professions, is constantly being reviewed by the faculty. The College of Pharmacy reserves the right, without advance notice, to change the content, duration and sequence of any course included in the curriculum leading to the 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.
Law
College Of Law

EUGENE N. HANSON, Dean

In addition to the colleges whose courses are listed in this catalog, Ohio Northern University also maintains a College of Law on its campus. This college is accredited by the American Bar Association and is a member of the League of Ohio Law Schools and the Association of American Law Schools. It offers a three-year program leading to the degree of Juris Doctor. Its graduates are eligible to take the bar examination in all of the states by virtue of its accreditation by the American Bar Association.

The College of Law requires that all entrants have a Bachelor's degree.

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

Practice Court
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The year refers to the time of initial service to the University.

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DAVID E. BOWLING, JR., B.S.Ed. (Wilmington), M.Ed. (Ohio U.), 1959, Assistant Professor of Industrial Arts

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

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

KAILASH CHANDER CHOPRA, B.Sc.E. (Banaras Hindu U.), M.E. (Roorkee U.), M.S. (Ohio State), 1964, P.E. (Ohio), Assistant Professor Civil Engineering

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, Riverside Hospital

CHARLES F. CONKLIN, B.A. (Waynesburg), M.A., Ph.D. (Pittsburgh), 1966, Chairman, Department of Economics and Business Administration, Professor of Economics
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 Instructor

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

ROBERT RALPH DAVIS, JR., B.A., M.A. (Kent State), 1966, Instructor in History

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

CLYDE H. DORNBUSCH, B.A. (DePauw), M.A., Ph.D. (Duke), 1962, Chairman, Department of English, Speech and Theatre, Associate Professor of English

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, Vice President for Academic Affairs, Professor of Religion

MARILYNNE S. ELLERY, B.S.Ed. (Ohio Wesleyan), M.E. (Toledo), 1963, Assistant Professor of Elementary Education

ELINOR E. EMERY, B.A. (Ohio Northern), M.Sc. (Ohio State), 1965 Instructor in Biology

MARVIN ENGLISH, B.S. (Ohio Northern), A.M. (Columbia), 1949, Chairman, Department of Health and Physical Education, Associate Professor of Physical Education

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

MARIA ANTONIETA ESPINO, Ed.D. (Central U., Cuba), 1964, Assistant Professor of Spanish

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

ROBERT P. FISCHELIS, Ph.G., Ph.C., Pharm.D. (Medico-Chirurgical Col. of Phila), B.S. (Temple), Ph.M., Sc.D. (Phila. Col. of Pharmacy and Science), Sc.D. (Rutgers), 1963, Dean Emeritus, College of Pharmacy, and Director of Continuing Studies

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

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

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

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


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

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
DONALD W. HASTINGS, B.S. (Springfield, Mass.), M.A. (Bowling Green), 1966, Instructor in Psychology
BYRON L. HAWBECKER, B.A. (Manchester), M.S. (Arizona), 1963, Instructor in Chemistry (Leave of Absence)
ARCHIE V. HILLERY, B.S.C.E. (Ohio Northern), P.E. (Ohio), 1954, Associate Professor of Civil Engineering
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 (Leave of Absence)
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 Hospital

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

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 IGNASIUS, A.B. (Aquinas), M.A. (Michigan State), 1966, Instructor in 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

HILDRED B. JONES, A.B. (Blue Ridge College), A.M. (West Virginia), Ph.D. (Pittsburgh), 1954, Director of Testing and Teacher 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

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 Theatre, Director of Theatre

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

FREDERICK I. KUHNS, B.A. (Ohio State), B.D. (Union), A.M. (Chicago), Ph.D. (Chicago), 1960, Head 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 C. 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, Instructor in Music

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

NOEMI LORENZANA, B.A. (Texas Woman's U.), 1966, Instructor in Spanish

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

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

WILLIAM M. McDaniel, B.A. (Wofford), B.D. (Harvard Divinity), Ph.D. (Duke), 1966, Assistant Dean, College of Liberal Arts with rank of Assistant Professor

RALPH L. McFARLAND, B.S.Ed. (Wilmington), 1957, Director of Financial Aids and Placement with rank of Instructor
JOHN W. McNABB, B.S.C.E. (West Virginia), M.S., Ph.D. (Lehigh), P.E. (Pa.), 1966, Professor of Civil Engineering

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

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

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), 1958, Assistant Professor of Physics (Leave of Absence)

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

DONALD E. MILKS, B.C.E. (Clarkson), M.S., Ph.D. (Arizona), P.E. (Arizona) (Ohio), 1965, Assistant Professor 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, Head, Division of Social Sciences

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

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

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

MICHAEL R. PALMISANO, B.S.Ed. (Michigan), M.Ed. (Miami, Ohio), 1966, Instructor in Health and Physical Education, Head Varsity Wrestling Coach
B. GAIL PARSONS, B.S., M.S. (Indiana), 1964, Assistant Professor of Education  
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RONALD G. PATTON, B.S.Ed. Ohio Northern), M.Mus.Ed. (Indiana), 1966, Instructor in Music  
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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  
RANDY M. RASSOUL, B.A. (Toledo), M.A. (Michigan), 1964, Instructor in Foreign Language  
JAMAL A. RASSOUL, B.A. (Bagdad), 1966, Instructor in Economics and Business Administration  
ARDEN ROBERSON, B.S.Ed. (Ohio Northern), M.E. (Kent), 1960, Assistant Professor of Physical Education  
DONALD L. ROBERTSON, A.B. (Miami), LL.B. (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  
RONALD E. ROLL, B.S., M.S. (Ohio State), 1964, Instructor in Physics  
HENRY D. ROTH, Ph.G., B.S. (Florida), M.S. (North Carolina), Ph.D. (Ohio State), 1964, Professor of Pharmacy  
VIRGIL R. RUBECK, B.S., M.S., (Indiana State), Ed.D. (Indiana U.), 1962, Assistant Professor of Education  
GEORGE W. SHERTZER, A.A. (Ohio Northern), 1956, Alumni Secretary
MATTHIAS SCHMITZ, Lehrer-Seminar, Essen; A.M., Ph.D. (Harvard), 1952, Professor of Foreign Languages

FRANC C. SHAULIS, JR., B.Mus. (Rochester), Cert.in. Russian Studies (U. of Edinburgh, Scotland), M.A. (Ohio State), 1966, Instructor in Russian

MERLE R. SHEETS, B.S.Pharm. (Mass. Coll. of Pharm.), 1965, Assistant Professor of Pharmacy Administration, Assistant Dean, College of Pharmacy

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

HOWARD P. SMITH, B.S. (Mount Union), M.A. (Ohio State), Ph.D. (Pittsburgh), 1966, Instructor in Education, Western Ohio Educational Foundation, Celina, Ohio

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

GUY R. SOLOMON, JR., B.S. (Kent State), 1965, Director of Public Information

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 in Business Education

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

ELDON H. SUND, B.S. (Illinois), Ph.D. (Texas), 1966, Assistant Professor of Chemistry

FRANK J. TAUSSIG, A.B. (Oberlin), M.S. (Case Institute), 1966, Instructor in Mathematics
MOHAMAD A. TAYIM, B.A. (Ohio Wesleyan), M.A. (E. New Mexico), 1966, Instructor in Mathematics

JOSEPH M. THEODORE, JR., B.S. (Northeastern), M.S. (Wisconsin), Ph.D. (Mass. Coll. of Pharm.), 1966, Associate Professor of Pharmacy, Chairman, Department of Pharmacy

GEORGE THOMPSON, B.A. (St. Olaf), M.A., J.D. (Wisconsin), 1966, Associate Professor of Law

MARION ELMER TINSLER, A.B. (Bluffton), B.D. (Garrett), Th.D. (Iliff), 1943, Chairman, Department of Philosophy and Religion, Professor of Philosophy and Religion, Head, Division of Humanities

ROBERT E. TIPPLE, B.A. (Ohio Northern), D.D.S. (Ohio State), 1962, Assistant Professor of Biology

RICHARD M. TRICK, B.S.Ed. (Ohio Northern), 1966, Admissions Counselor

JAMES S. UDY, B.S. (Sydney U.), S.T.B. (Boston), Ph.D. (Boston), 1963, Director of Religious Life with rank of Associate Professor

JOSEPH A. UVEGES, JR., A.B. (Ohio Northern), M.A., Ph.D. (U. of Florida), 1964, Instructor in History and Political Science

ERNEST A. VAN ATTA, B.S.Ed. (Ohio Northern), M.A. (Ohio State), 1960, Assistant Professor of Education

ALBERT OLIVER VANNORSDALL, A.B. (DePauw), S.T.B. (Boston), 1965, Instructor in Religion

JEANNE R. VANNORSDALL, A.B. (Boston), 1965, Instructor in Mathematics

GEORGE D. VAUBEL, A.B., LL.B. (Ohio Northern), LL.M. (Michigan), 1958, Professor of Law

HAROLD P. VAYHINGER, B.Sc., B.Ed. (University of Cincinnati), M.A. (Columbia), Ed.D. (University of Tennessee), 1966, Chairman and Director of Teacher Education, Associate Professor of Education, Head, Division of Teacher Education

LOUIS D. VOTTERO, B.S.Pharm. (Duquesne), M.S. (Ohio State), 1966, Assistant Professor of Pharmacy

DAVID WEIMER, B.S., M.S. (Ohio State), 1964, Assistant Professor of Physics

LOWELL E. WEITZ, B.S.Mus.Ed. (Ohio Northern), M.F.A. (Ohio), D.M.A. (U. of Mo.), 1960, Assistant Professor of Music

JOHN H. WEST, B.F.A., M.F.A. (Ohio University), 1959, Chairman, Department of Art, Associate Professor of Art
GENEVIEVE WHEELOCK, A.B. (Ohio Wesleyan), B.S.L.S. (Western Reserve), 1949, Assistant Librarian, College of Law, with rank of Assistant Professor

GEORGE CARL WHIPPLE, B.A. (Albion), S.T.B., Ph.D. (Boston), B.P.A. Brooks Inst. of Photography), 1966, Assistant Professor of Philosophy and Religion

HOWARD E. WHISLER, B.S.E. (Michigan), M.S.E. (Akron), P.E. (Indiana), 1964, Assistant Professor of Mechanical Engineering

DALE L. WILHELM, B.S. (Illinois), M.S., Ph.D. (Tennessee), 1966, Professor of Chemistry

JAMES ANDREW WOOFTER, A.B. (Salem), A.M. (Virginia), Ed.D. (Cincinnati), 1947, Recording Registrar with the rank of Professor

PAUL C. M. WU, B.S.C.E. (National SWA U., China), M.S. (Oklahoma), P.E. (Iowa), 1964, Assistant Professor of Civil Engineering

ROGER D. YOUNG, B.S. in Business (Miami, Ohio), M.B.A. (Xavier), 1964, Instructor in Accounting

STANLEY A. ZWERLING, B.A. (Omaha), M.A. (Bowling Green), 1965, Instructor in Speech

PART-TIME FACULTY

LINDA JO BANKS, B.A. (Yankton), M.A. (Emory), 1966, Lecturer in English

VIRGINIA BAUHOF, B.A. (Miami), 1966, Instructor in Mathematics

CHARLES L. BLUMSTEIN, M.D. (Louisiana State U. Sch. of Medicine), 1961, Lecturer in Law

KATHRYN CRIDER, B.S.Ed., M.S.Ed. (Bowling Green), 1966, Instructor in Psychology

NANCY DAPORE, LL.B. (Ohio Northern), 1962, Instructor in Economics and Business Administration

WALTER M. FRAZIER, Ph.C. (Cincinnati), 1964, Lecturer in Hospital Pharmacy


DAVID HAYES, M.A. (Duke), 1966, Lecturer in Mathematics, Riverside Hospital

JAMES A. JONARD, B.S.Ed. (Ohio State), 1966, Lecturer in Chemistry, Riverside Hospital
CHARLES OREN LEE, B.Sc.in Pharm. (Kansas), M.S. (Chicago), Ph.D. (Wisconsin), R.Ph. (Indiana), 1954, Professor of Pharmacy

MAXINE McCABRIA, B.A. (Kansas), M.S. (Iowa State), 1965, Instructor in Nutrition, Lima Memorial Hospital

ELIZABETH MILLER, B.A. (Ohio Northern), 1965, Lecturer in English

DOLORES MOORE, A.B. (Marshall), M.A. (Ohio U.), 1966, Lecturer, Department of Economics and Business Administration

HENRY PLUKKER, B.A.Mus. (Wuerzburg Conserv. of Mus.), M.Mus. (German State H.S. of Mus.), 1966, Lecturer in Music

FRANCES H. PRICE, B.S.Ed. (Ohio Northern), 1966, Visiting Lecturer in Latin

JAMES RUEF, B.A. (Ohio Northern), M.A. (Indiana), 1966, Lecturer in Speech

JERRY SILVER, M.A. (Ohio State), 1966, Lecturer in Mathematics, Riverside Hospital

CECIL D. SMITH, A.B. (Ohio Wesleyan), S.T.B., M.R.E. (Boston), 1959, Assistant Professor of Bible and Religion

DEAN SOMMERS, M.A. (Ohio State), 1966, Lecturer in Mathematics, Riverside Hospital

ROBERT E. STOBAUGH, B.S. (Southwestern, Memphis), M.S., Ph.D. (Tennessee), 1966, Lecturer in Chemistry, Riverside Hospital

JOHN TUDOR, A.B. (Ohio State), LL.B. (Duke), 1965, Lecturer in Law

JANE WALTER, B.S. (Bowling Green), 1966, Lecturer in Physical Education, Riverside Hospital


RONI ZWERLING, B.A. (Bowling Green), 1966, Instructor in Sociology and Psychology
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