College of Liberal Arts

Oscar G. Darlington, Dean

DIVISIONS AND DEPARTMENTS

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

Natural Sciences: Biology, Chemistry, Mathematics, Physics.

Social Sciences: Economics and Business Administration; History and Political Science; Psychology and Sociology.

Teacher Education: Elementary and Secondary Education; Industrial Arts Education; Physical Education; Music Education; Art Education; Business 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.
ADMISSION 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 fifteen acceptable units of high quality work who are recommended by the high school principal. Twelve of these fifteen units shall be in any combination of the following subjects: English (four years), languages, history, mathematics (one year of algebra required), and natural science. Deficiencies in entrance requirements may be made up to the extent of two units, preferably during the prior summer or during the first quarter of the freshman year, or from other agencies approved by the University. Priority is given immediately to applicants with an Ohio “State Board Course in Basic Studies” certificate.

An acceptable score on the American College Testing Program (A.C.T.) or its equivalent is expected of all in-coming 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 students on the Advanced Placement Program are accepted at Ohio Northern University.

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

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

THE DEGREE OF BACHELOR OF ARTS

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

Prescribed. Courses prescribed in the program of general education include one year of English Composition; a quarter of Speech; eighteen hours in two of the social sciences; Historical Study of Philosophy and Religion (or a one-year course in philosophy or religion, upon approval); six quarters in two of the natural sciences, including Math. 111, 112 and 113, but excluding Chemistry 105 and Physics 210; one full year of advanced work in English or
American Literature; two quarters in art, music, theatre, or a foreign language culture course; and two years of one foreign language or their equivalent.

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

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

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

THE DEGREE OF BACHELOR OF SCIENCE

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

THE DEGREE OF BACHELOR OF SCIENCE IN EDUCATION

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

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

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

All students preparing to teach at either the elementary or secondary level must have their programs approved by the Head 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.

*In Clark Hall, Freshmen Women’s Residence*
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.

ASSOCIATE IN ARTS CERTIFICATE

A Certificate of an Associate in Arts may be awarded to students completing a special two-year course in the College of Liberal Arts. For further information consult the Dean of the College.

PRE-PHARMACY

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

COMBINATION CURRICULA

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

The Arts-Engineering Program, a five-year curriculum, was introduced in 1964 for the superior student challenged by the rewards of understanding more fully both human society and current technology. The student enrolls simultaneously in the Colleges of Liberal Arts and Engineering, pays at the engineering college rate, and receives an appropriate degree in each college upon graduation. To enter this program a freshman 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.

ARTS-MEDICAL TECHNOLOGY, ARTS-NURSING

Students completing a minimum of 135 quarter hours of work in the College of Liberal Arts, including all division requirements and a major in biology or chemistry will be awarded the Bachelor of Arts degree on presentation of
evidence of registration as a Medical Technologist by the National Registry or by the presentation of evidence of the R.N. degree. The Departments of Biology and Chemistry allow one-fourth of the total number of credit hours required for a major for work completed during the one-year internship required for registration. Curricula outlines are available from either department.

A combined curriculum in liberal arts and nursing, in cooperation with Memorial Hospital, Lima, Ohio, is offered students who have those personal and social qualities essential to success in the field of nursing.

Ohio Northern also provides instruction with academic credit for first-year students at Riverside Methodist Hospital, Columbus, Ohio.

**PRE-PROFESSIONAL CURRICULA LEADING TO THE BACHELOR OF ARTS DEGREE**

**DENTISTRY AND MEDICINE**

Most professional schools of medicine or dentistry advise a well-rounded undergraduate liberal arts education with emphasis on social studies as well as on courses specifically preparatory to the study of medicine or dentistry.

**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.) degree or the Bachelor of Divinity (B.D.) degree with a major 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.

**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 young men well-equipped for serious dedication to the Christian ministry.

PRE-LAW
In general, law colleges advise a broad liberal undergraduate preparation.

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 departmental chairman. The completed card indicates that the department accepts a student as a major. To change from one department to another, the student shall complete a Change of Major card, also obtainable as indicated above. A student is officially accepted as a major in a department only when he has completed the above procedure.

4. No course for which the student has received a "D" is acceptable toward a major field.
5. Seniors taking courses in the “100” series in other than foreign languages or mathematics must complete additional work of a high quality for full credit. Seniors selecting “100” courses should consult the Dean of the college.

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

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

CLASSIFICATION OF STUDENTS

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

WARNING AND PROBATION

A quality point average of 2.0 is necessary for graduation.

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

If a student on warning receives a quality point average for the following or any subsequent quarter lower than that stipulated for satisfactory standing, he will be placed on probation, and so long as he is on probation he will not be permitted to represent the university by participating in extra-curricular activities. If his quarter average rises to the required level but his accumulative average is still below the required level, he will be continued on probation.

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

A student on probation whose average for the following quarter is below the required minimum for that quarter and whose accumulative average is also below the minimum may be recommended to the President for suspension or dismissal from the University.

Students may at any time also be placed on strict probation. These students must report in person every two weeks to the Office of the Dean of the College until the end of the quarter at which time they go on good standing or are recommended for dismissal.
SENIOR COMPREHENSIVE EXAMINATION

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

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

GRADUATION

To graduate with the Bachelor's degree, a student must complete a minimum of 180 quarter hours of academic work plus six hours of physical education, with an accumulative qualitative point average of at least 2.0.

A residence period of the last three quarters and the completion of at least forty-five quarter hours, with at least ninety quality points, elected largely from "300" and "400" courses in the College of Liberal Arts of this University are minimum requirements for a student admitted on advanced standing.

THE DEPARTMENTAL COURSES

ART

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

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

The artist should be educated comprehensively through a program combining professional training and broad study in the liberal arts which provides ideas, self-discipline and discovery essential to his preparation. Ohio
Northern University has as its intended goals for the student majoring in art: (1) to provide the student with as broad an understanding of art as is possible; (2) to acquaint the student with historical and cultural knowledge of the past and present; (3) to develop in the student a working proficiency through mastery of the tools and skills of his profession; and (4) to encourage and stimulate 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 hours, in addition to minimum requirements for certification, 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 reserves the right to retain for its collection one completed work from each course taken for credit within this department. A comprehensive examination in art in conjunction with a public exhibition of the student's studio work is prerequisite for graduation with a major in art.

100. Sketching. An introduction to “thinking” visually with the media of art and of recording ideas and experiences for further refinement. 1 hour.

101-102. Art for Elementary Teachers. Designed for prospective classroom teachers in the elementary schools; materials, techniques, and methods of utilizing them are stressed. 6 hours.
111, 112, 113. DRAWING AND DESIGN. An integration of the traditional courses of study in drawing and design. Emphasis on development of technique, terminology and its application, styles, and personal interpretation of problems. No prerequisite; required for all art majors. 15 hours.

140. ART HISTORY SURVEY. An historical study of style in painting, sculpture and architecture from pre-historic times to the present. Illustrated lectures. 3 hours.

199. RENDERING. Emphasis on the finished work and its presentation and construction. Various two-dimensional media. 1 hour.

200. INTRODUCTION TO ART. A one-quarter survey of the visual arts. Illustrated lectures. 3 hours.

211, 212-213. FIGURE DRAWING. Advanced drawing introducing the human form and its anatomy in action and at rest. A grade of "B" or better in Art 212 is prerequisite for Art 213. 9 hours.

221. JEWELRY. Design and construction of jewelry in a variety of materials. By permission. 3 hours.

222. LETTERING. Selected elements, styles, principles, media and techniques of lettering. By permission. 3 hours.

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

331. WATERCOLOR. Painting with watercolor and certain other selected water-soluble media including gouache and acrylic-paints. 3 hours.

332, 333. PAINTING. Methods, materials, techniques, and expression in painting, especially in oil based media. By permission. 6 hours.

341, 342, 343. SCULPTURE. Sculpturing in various media with a variety of techniques. By permission. 9 hours.

399. ART EDUCATION. Laboratory-Seminar for teachers not majoring in art. Techniques, materials, sources. Open only to juniors and seniors. Permission of instructor. May repeat to total of six hours. 3 hours.

411, 412, 413. **Advanced Ceramics.** Open only to juniors and seniors with permission of instructor. Variable credit to be determined prior to registration. **3-9 hours.**

421, 422, 423. **Advanced Painting.** Open only to juniors and seniors with permission of instructor. Variable credit to be determined prior to registration. **3-9 hours.**

440. **Art Problems (Senior art majors only).** Advanced independent study of any approved problem within the realm of the art department. May be repeated to maximum of nine hours in any area of specialization within the departmental offerings. 440.07, Art History; 440.16, Painting or Graphics; 440.03, Ceramics; 440.19, Sculpture; 440.09, Jewelry or other approved craft. **1-3 hours.**

450. **Ancient-Medieval.** Study of art beginning with the pre-historic period through the 14th century. Illustrated lectures. No prerequisite. **3 hours.**

460. **The Renaissance.** Study of art in the 15th and 16th centuries in Italy and Northern Europe. Illustrated lectures and field trips. Art 140 prerequisite, or permission of instructor. **3 hours.**

470. **Impressionism and Post-Impressionism.** Historical study and analysis of the art produced during the latter half of the 19th century in Europe and its effect on Western Art. Art 140 prerequisite, or permission of instructor. **3 hours.**

480. **Contemporary Trends.** Historical study of the 20th century to date; analysis of the problems, the solutions, and the diversity of motivation and product of the contemporary artist, architect, craftsman, and critic. Art 140 prerequisite, or permission of instructor. **3 hours.**

**Biology**

(Department 121)

Professors Chester, Stauffer; Associate Professors Bowden (Chairman), Butler; Assistant Professors Dawson, Gidwani, Hoch, Snyder, Tipple

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

Students majoring in biology complete a minimum of 45 hours in the department, including courses 111, 112, 113, 201, 202, 223, (301, 302, 303) or (331, 332, 333) 402, 440, 450, 423, or 430, or 433 and a comprehensive examination in Biology. In addition, students majoring in Biology complete at least one year of mathematics, one year of chemistry, one year of physics and the second year of a foreign language. Courses in statistics, psychology, sociology and a second year of chemistry are recommended.

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

Alternate 111-112-113. GENERAL BIOLOGY INDEPENDENT STUDY PROGRAM. A freshman or sophomore with department approval, or an upper classman at his own option, may receive credit for General Biology by completing an independent study program under departmental supervision. Details are available from the chairman. 12 hours.

121-122-123. ANATOMY AND PHYSIOLOGY FOR NURSES. An introductory study of the structure and function of the human body. The laboratory includes dissection of a representative mammal and experiments illustrating physiological principles. Lecture, discussion, laboratory, 5 hours. Nursing students only. 9 hours.

201, 202. BOTANY. A study of advanced concepts and principles concerning plant life; general classification, life cycles, and environmental relationships. For majors in biology and students who, from a cultural standpoint, wish to know something of the origin and development of plants. Discussions in the presence of laboratory materials. 5 hours. Prerequisite: General Biology 111-113, or permission of the instructor. 8 hours.

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

223. INVERTEBRATE ZOOLOGY. A systematic study of the invertebrate phyla. Discussion in the presence of laboratory materials, 5 hours. Prerequisite: General Biology 111-113, or permission of the instructor. 4 hours.
301, 302, 303. VERTEBRATE ANATOMY AND EMBRYOLOGY. A comparative study of vertebrates which includes discussion and laboratory dissection of the different systems, general principles of vertebrate development, laboratory study of certain vertebrate embryos. For biology majors and students who expect to teach biology, study medicine, or who from a cultural standpoint, wish to know something of the origin and development of the human body. Lecture, discussion, laboratory, 8 hours. Prerequisite: General Biology 111-113, or permission of the instructor. 12 hours.

331, 332, 333. PHYSIOLOGY AND ANATOMY. A study of the structure and function of the human body; certain lectures by guests in fields of their specialization; all sessions held in the Julius and Fannie Rogoff Laboratory of Physiology. The laboratory includes dissection of a representative mammal and experiments illustrating physiological principles. Lecture, discussion, laboratory, 6 hours. Prerequisite: General Biology 111-113, or permission of the instructor. 12 hours.

402. LABORATORY TECHNIQUE. The principles and procedures used in the killing, preserving and preparing of biological materials; selected laboratory experiences. Lecture and class work, 1 hour; laboratory, 6 to 8 hours. Permission of instructor. 3 hours.

423. ECOLOGY. Living organisms as dependent and contributing members of an integrated community in a living and non-living environment. Prerequisite: Botany 202, Invertebrate Zoology 223, or permission of the instructor. 3 hours.

430. HEREDITY. A study of the principles of inheritance in plants and animals; human inheritance and the problems of eugenics. Prerequisite: General Biology 111-113, or permission of the instructor. 3 hours.

433. ORGANIC EVOLUTION. A study of the development of the organic world, and an examination of the evidences of evolution and the theories attempting to explain the method of evolution. Prerequisite: General Biology 111-113, and permission of the instructor. 3 hours.

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

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

(Department 122) Professor Bettinger (Chairman); Associate Professor Messer; Assistant Professors Goodrich, McClure; Mr. Hawbecker, Mrs. Matson, Mr. Petheram

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, although not as extensive preparation as in the Bachelor of Science program.

All chemistry majors fulfill basic university and College of Liberal Arts requirements, take two years of German and Chemistry 131-132-133, 241-242-243, 321, 341-342-343 and 352.

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

In addition, for the Bachelor of Science degree, Chemistry 353, 363 or 373, 451, 462 and three to five hours of advanced courses chosen from chemistry, physics or mathematics are required.

A grade of C or better is required in all chemistry courses to be counted toward the major.
The following is the basic curriculum for a chemistry major:

**FIRST YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Chemistry 131-132-133</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 151, 152, 153</td>
<td>5</td>
</tr>
<tr>
<td>English 151, 152, 153</td>
<td>3</td>
</tr>
<tr>
<td>*Soc. Sci. Elective</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education</td>
<td>1</td>
</tr>
<tr>
<td>Liberal Arts Orientation</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
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*Social Science or other elective depending upon the degree sought.

**SECOND YEAR**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Chemistry 241-242-243</td>
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</tr>
<tr>
<td>Mathematics 251, 252, 253</td>
<td>5</td>
</tr>
<tr>
<td>Physics 241, 242, 243</td>
<td>5</td>
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<tr>
<td>Physical Education</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td>16</td>
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</table>

**THIRD YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 321</td>
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<tr>
<td>Chemistry 341-342-343</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 352-353*</td>
<td>2</td>
</tr>
<tr>
<td>Chemistry 363 or 373</td>
<td>3 or 2</td>
</tr>
<tr>
<td>German 101-102-103</td>
<td>4</td>
</tr>
<tr>
<td>Philosophy &amp; Religion 231, 232, 233</td>
<td>3</td>
</tr>
<tr>
<td>English or American Literature</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
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</tbody>
</table>

*Chem. 353 is optional for the B.A. degree.

The fourth year depends on whether the student wishes to meet the requirements for the B.A. or the B.S. degree.

**FOURTH YEAR FOR B.S. DEGREE**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Chemistry 451</td>
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<tr>
<td>Chemistry 462</td>
<td>5</td>
</tr>
<tr>
<td>†Chemistry 481-482-483</td>
<td>2</td>
</tr>
<tr>
<td>*Advanced Course</td>
<td>3-5</td>
</tr>
<tr>
<td>German 221-222-223</td>
<td>3</td>
</tr>
<tr>
<td>Fine Arts 6 hrs., Speech 3 hrs.</td>
<td>3</td>
</tr>
<tr>
<td>Social Science</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
<td>16</td>
</tr>
</tbody>
</table>

*Choices here include Chemistry 363, Chemistry 473, or certain advanced courses in the Physics and Mathematics Departments.

†Optional
FOURTH YEAR FOR B.A. DEGREE

Chemistry or other electives 7 7 5-7
German 221-222-223 3 3 3
Fine Arts 6 hrs, Speech 3 hrs. 3 3 3
Social Science 3 3 3

16 16 14-16

CHEMISTRY COURSES

105. The Science of Chemistry. (Science majors may not take this course for credit). A course primarily for students preparing for public school teaching, other than in mathematics or the sciences. The structure of matter and chemical consequences. 3 hours.

131-132-133. General Chemistry. Basic principles; including a study of inorganic reaction chemistry, correlation with modern theory and periodic relationships. Experiments illustrating principles, basic quantitative techniques, and methods of separation of ions in aqueous solutions. Three hours of lecture and one three-hour recitation-laboratory period per week. Prerequisite: Mathematics 111-112-113 or concurrent enrollment in Mathematics 151. 12 hours.

231-232-233. Organic Chemistry. A systematic study of organic compounds introducing the modern approach to bonding, structure, and mechanisms of reaction. The laboratory consists of basic techniques used in synthesis, identification, and separation of organic compounds. Three hours of lecture and one three-hour laboratory period per week. Prerequisite: Chemistry 133. 12 hours.

241-242-243. Organic Chemistry for Majors. The lecture is identical with and meets with the Chemistry 231-232-233 lecture. The laboratory is separate from Chemistry 231-232-233 and emphasizes modern techniques used in synthesis, qualitative identification and separation of organic compounds. Three hours of lecture and two three-hour laboratory periods per week. Prerequisite: Chemistry major and Chemistry 133. 15 hours.

321. Intermediate Chemistry. Emphasis is placed on selected aspects of inorganic and analytical chemistry. Two lectures and two three-hour laboratory periods per week. Prerequisite: Chemistry 133 and Chemistry 233 or 243. 4 hours.
341-342-343. PHYSICAL CHEMISTRY. A fundamental course emphasizing thermodynamics, kinetics, quantum theory, and structure of matter. Three hours of lecture per week. Prerequisite: Chemistry 233 or 243, Physics 243, and Mathematics 253. C or better is required in prerequisite courses. Corequisite: Chemistry 321. 9 hours.

352-353. PHYSICAL CHEMISTRY LABORATORY. A laboratory course designed to illustrate the major concepts stressed in Chemistry 341-342-343. Two three-hour laboratory periods per week for 352. One three-hour laboratory period per week for 353. Corequisite: Chemistry 342-343. 3 hours.

363. ADVANCED ORGANIC CHEMISTRY. An advanced course discussing modern bonding concepts and mechanisms of organic reactions. Three hours of lecture per week. Corequisite Chemistry 343. 3 hours.

373. JUNIOR RESEARCH. Corequisite: Chemistry 343. 2 hours.

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

462. ADVANCED ANALYTICAL CHEMISTRY. The theory and application of instrumental analysis. Three hours of lectures and two three-hour laboratories per week. Prerequisite: Chemistry 343 and Chemistry 353. 5 hours.

473. ADVANCED PHYSICAL CHEMISTRY. Three hours of lectures per week. Prerequisite: Chemistry 343. 3 hours.

481-482-483. SENIOR RESEARCH. Prerequisite: Chemistry 353 and Chemistry 373. Corequisite: Chemistry 451 and Chemistry 462. 6 hours.

ECONOMICS AND BUSINESS ADMINISTRATION

(Department 131)

Associate Professors Humphrey (Acting Chairman), Cooley; Assistant Professor Carlson; Mr. Young and Special Lecturers

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

DEPARTMENTAL REQUIREMENTS

A major must include the following:
- Economics (Accounting) 131, 132, 133
- Economics 201, 202, 203
- Business Law 322
- Money & Banking 352, 353

Mathematics of Finance 181, 182; Elementary Statistics 183, in the Mathematics Department are required. However, they do not count toward the 45 hours required for a major. A student may be excused from Math 181 if he has had Math 151, College Algebra, or a year of Fundamental Math 111, 112, 113. All students majoring in the Department are required to take two years of foreign language or the equivalent as determined by the Department of Foreign Language. Seniors should take Economics 440 in preparation for the Comprehensive Examination.

131-132-133. Principles of Accounting. Fundamental process of accounting applied to service, trading and manufacturing concerns; preparation of working papers and financial statements from properly arranged accounts in general ledger; practice sets of representative business concerns are used to unify the principles and theories studied. (Required of all Economics majors.) 9 hours.

201-202-203. Principles of Economics. An analytic description of our economic system; the price system, supply and demand factors, money and banking, the relation of government to the economy, the role of producers and consumers; the analysis of income and employment, and current economic problems. (Required of all Economics majors). 9 hours.

213. Business Organization. A study of the various types of business and industrial organizations, recent trends in management, and methods required for administrative, managerial and industrial control. 3 hours.
222. **Office Machines and Practice.** Operation of business machines; instruction on listing and non-listing adding machines, registering, calculating and bookkeeping machines; application of accounting machines, punch card systems and electronic computers. 3 hours.

301. **Intermediate Accounting.** Accounting theories with problem illustrations and applications. Classification of accounts, balance sheet forms, items and analysis of balance sheet, depreciation, goodwill, bonds and sinking funds, amortization, surpluses and reserves, statement of affairs, partnerships, and insurance. Prerequisite: Economics 133. 5 hours.

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

322, 323. **Business Law.** First quarter required of all economics majors. Legal aspects of common business transactions: contracts, the formation and results of agencies, principles of real estate transactions, marketing of goods as it relates to personal property, and negotiable instruments. Economics 323 surveys labor law and legislation, and the public interest in labor disputes; the uniform code provision. 6 hours.

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

332. **Time and Motion Study.** The theory and application of time and motion study techniques to the improvement of industrial operations; 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 and acceptance sampling techniques as tools of scientific management. 3 hours.

341. **Labor Economics.** Labor as a factor in maximizing production, its use in relation to other factors, and its remuneration; importance of a freely competitive labor market and of 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.** The function of marketing in the economic system in its institutional aspects, its efficiencies, and its current trends of development; government regulation of markets: evaluation of actual business problems. 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 will be used to consider the problems of expansion, recapitalization, and failure. 3 hours.
363. **Personnel Management.** A course analyzing the functions of the personnel department in industry, its development, and techniques. Text will be supplemented by case analysis of problems in selection, training, and incentives. The course is designed to broaden the student's appreciation of the human factor in industry. *3 hours.*

370. **Computer Principles.** A basic course in programming of electronic digital computers. Detail study is given to characteristics of computers, computer programming and computer coding, and accounting, auditing, and data protection. Prerequisite: Cost Accounting 312. *3 hours.*

371. **Salesmanship.** A study of the background, modern requirements and techniques of salesmanship, with emphasis on sales management. *3 hours.*

372. **Advertising.** For those who plan to enter advertising, as well as what the business executive needs to know about advertising media, national and retail advertising; organization and administration of advertising departments and agencies. *3 hours.*

373. **Transportation.** The economics of transportation—waterway, railway, highway, pipeline, and air; the development of transportation 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; problems involving the law and regulations; tax areas applicable to different forms of business organization. Prerequisite: Accounting 131, 132, 133. *6 hours.*

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

391. **Business Communications.** The techniques of writing business letters and reports, including technical reports; efficient and accurate communication of economic and business facts and the writer's conclusion therefrom. *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: Econ. 301. *5 hours.*

411. **Comparative Economic Systems.** Capitalism, socialism, fascism, and communism as they touch on the economics of pricing, production and distribution; welfare implications of each weighed against pure theoretical concepts. *3 hours.*
413. Budgeting. Estimating income and expenses; organization for controlling expenditures and for measuring the operating efficiency of the organization. Prerequisite: Accounting 301. 5 hours.

421. International Economics. Theories and actual current problems of trade between nations; governmental restrictions and controls, such as tariffs, quotas and exchange controls, the importance of multi-lateral trade; scarce resources, population, and employment trends in relation to their bearing on world economics. 3 hours.

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

432. Government and Business. The history and development of government regulation of economic affairs in the United States; provisions of the U. S. Constitution, leading court opinions, and the more important regulatory laws of recent years. 3 hours.

433. Contemporary Economic Problems. Analysis of current economic problems, domestic and international; problems in agriculture, population, old age, chronic unemployment, labor-management relations, underdeveloped countries, and the role of the United States in the world economy. 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; the spread of empire and the economic rivalry 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; the works of Adam Smith, Malthus, Ricardo, Marx, Marshall, Keynes and our modern American economists; the influence of environment and political thought. Text and original sources. 3 hours.
452. Advanced Accounting. Departmental, manufacturing, branch and consignment, contractor's, real estate development, receivership, and estate accounting; statement of application of funds and consolidated statements. Prerequisite: 311. 5 hours.

461. Investments. The investment of savings; common and preferred stocks, bonds of all types, building and loan shares, life insurance, real estate; balance sheets of firms analyzed for investment desirability; how to gain information about investments, the processes of investing, and the operations of the securities markets. 3 hours.

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

SECRETARIAL

101-102-103. Typewriting. Practical working knowledge of the typewriter; the business letter, office forms, compositions, rough drafts, and tabulation; accuracy and speed. 9 hours.

111-112-113. Shorthand. Gregg Simplified Shorthand; principles and practice in reading and writing. 9 hours.

211-212. Shorthand and Transcription. Speed and accuracy in production. Prerequisite: Shorthand 131, 113. 6 hours.

222. Office Machines and Practice. Study and use of such office machines as dictaphone, mimeograph, and calculator. See Economics 113. 3 hours.

223. Secretarial Practice. The secretarial profession; office mail, communication, travel, business reports, office organization, the financial and legal duties of the secretary. Prerequisites: Shorthand 211, Typewriting 103, and Office Practice 222 or equivalents. 3 hours.
EDUCATION

(DEPARTMENT 141)

PROFESSORS JONES (Chairman), BEHRENS, HANSON, SPENCER;
ASSISTANT PROFESSORS EARL, ELLERY, MACNAUGHTON, PARSONS, RUBECK, VAN ATTA

The Teacher Education Program is designed primarily to aid present and prospective teachers in helping themselves, children and youth identify and meet more effectively their physical, mental, social, personal, and spiritual needs. It is realized that self-improvement will occur among Education students as they develop successful techniques in the promotion of the learning process, and acquire useful knowledge that they can impart to others.

Experiences in working with children and youth in varied situations are provided that enable education students to relate theory to practice and to use content in the actual solving of significant problems of living. Evaluating education in terms of human growth and development is stressed.

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

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

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

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

**FIRST YEAR**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>English 151</td>
<td>3</td>
<td>English 152</td>
</tr>
<tr>
<td>West. Civ. 111</td>
<td>3</td>
<td>West. Civ. 112</td>
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<tr>
<td>Intro. Ed. 121</td>
<td>3</td>
<td>Art 101</td>
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<tr>
<td>Music 111</td>
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<td>Music 112</td>
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<tr>
<td>Math 111</td>
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<td>Math 112</td>
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*Does not apply toward 180 required for graduation.
SECOND YEAR

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<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tr>
<td>Phil./or Relg.</td>
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<td>Phil./or Relg.</td>
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<td>Sci. Elm. Tch. 283</td>
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<td>Biology 111</td>
<td>3</td>
<td>Handcrafts 210</td>
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<td>or</td>
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<td>Handcrafts 210</td>
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<tr>
<td>Chemistry 105**</td>
<td>4</td>
<td>Arts &amp; Crafts 200</td>
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<tr>
<td>Psych. 201</td>
<td>5</td>
<td>Pers. Hygiene</td>
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<td>15-16</td>
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THIRD YEAR

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<tr>
<td>312</td>
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<tr>
<td>U.S. Hist. 211</td>
<td>Am. Govt. 202</td>
<td>Am. Govt. 203</td>
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<tr>
<td>or</td>
<td>Child. Lit. 233</td>
<td>Teach. Soc. St. 311</td>
</tr>
<tr>
<td>Am. Govt. 201</td>
<td>Teach. Read. 341</td>
<td>Ohio Hist. 303</td>
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<tr>
<td>El. Sch. Curr.</td>
<td>3</td>
<td>Electives</td>
</tr>
<tr>
<td>Teach. Arith.</td>
<td>3</td>
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<td>Elective</td>
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FOURTH YEAR

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<tr>
<td>Eval. &amp; Meas.</td>
<td>Audio-Vis. Aids 430</td>
<td>Student Teaching,</td>
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<tr>
<td>466</td>
<td>3</td>
<td>Educ. 470</td>
</tr>
<tr>
<td>Geography</td>
<td>Hist. &amp; Phil. 401</td>
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<tr>
<td>Electives</td>
<td>9</td>
<td>Electives</td>
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</table>

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

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

*Does not apply toward 180 required for graduation.

**Those students who take Chemistry 105 in the Fall Quarter take
2. SPECIAL CERTIFICATION
   
a. Art Education
   Certification requirements for those majoring in Art Education are available from the department chairman.

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

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

3. SECONDARY EDUCATION. (Minimum requirements for certification in the subject teaching field can be found in the publication of the Ohio State Department of Education on file in the office of the Director of Teacher Education. Programs of studies leading to certification in the Social Studies Comprehensive major and Natural Science comprehensive are as follows:

Comprehensive Science Major

PROGRAM OF STUDIES

FRESHMAN YEAR

<table>
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<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>English 151</td>
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<td>English 152</td>
<td>3</td>
</tr>
<tr>
<td>Intro. to Educ. 121</td>
<td>3</td>
<td>Math 152</td>
<td>5</td>
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<tr>
<td>Math 151</td>
<td>5</td>
<td>Biology 112</td>
<td>4</td>
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<tr>
<td>Biology 111</td>
<td>4</td>
<td>Chemistry 132</td>
<td>4</td>
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<tr>
<td>Chemistry 131</td>
<td>4</td>
<td>Soc. Science</td>
<td>3</td>
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SOPHOMORE YEAR

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<tr>
<td>Chemistry 231</td>
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<td>Chemistry 232</td>
<td>4</td>
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<tr>
<td>Physics 241</td>
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<td>Physics 242</td>
<td>5</td>
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<tr>
<td>Math 251</td>
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<td>Math 252</td>
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<tr>
<td>P &amp; R 231</td>
<td>3</td>
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<td>3</td>
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### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Gen. Psych. 201</td>
<td>5</td>
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<tr>
<td>Literature</td>
<td>3</td>
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<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>Adol. Grow. &amp; Dev.</td>
<td>3</td>
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<tr>
<td>Biology 202</td>
<td>4</td>
</tr>
<tr>
<td>School &amp; Society</td>
<td>3</td>
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<tr>
<td>Biology 201</td>
<td>3</td>
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<tr>
<td>Physics 210</td>
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<td>Biology 203</td>
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<td>Physics 320</td>
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<td>So. Sc.</td>
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<td>Phys. 330</td>
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<td>Biology 203</td>
<td>4</td>
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### SENIOR YEAR

**Concentration in Physics**

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<th>Course</th>
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<tbody>
<tr>
<td>Physics 250</td>
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<td>Soc. Sc.</td>
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<tr>
<td>Education Elective</td>
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<tr>
<td>Eval. &amp; Meas. 460</td>
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<tr>
<td>Fine or Applied Art</td>
<td>3</td>
</tr>
<tr>
<td>Physics Adv. Lab.</td>
<td>2</td>
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<tr>
<td>Physics 302</td>
<td>5</td>
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<tr>
<td>Speech 271</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
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<tr>
<td>Physics 423</td>
<td>5</td>
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<tr>
<td>Electives</td>
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<tr>
<td>Student Teaching</td>
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<td>17</td>
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<td>15 or 16</td>
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**Concentration in Biology**

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

1. Social Studies Comprehensive—68 hours

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

### PROGRAM 1

- Western Civilization        9 hrs.
- American History             9 hrs.
- Elective in History          9 hrs.
- Political Science            18 hrs.
- Sociology                    9 hrs.
- Economics                    9 hrs.
- Geography                    3-5 hrs.
- Elective in Social Studies   3-6 hrs.
PROGRAM 2
Western Civilization 9 hrs.
American History 9 hrs.
Elective in History 9 hrs.
Political Science 9 hrs.
Sociology 18 hrs.
Economics 9 hrs.
Geography 3-5 hrs.
Elective in Social Studies 3-6 hrs.

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

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

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

PROFESSIONAL EDUCATION

Students preparing to teach in secondary schools are required to complete a minimum of 75% of a major in a subject matter department in the College of Liberal Arts and have the endorsement of
that department's chairman before qualifying for student teaching. Professional education requirements for students in the field of secondary education are listed below:

1. **Required Courses:**
   - 121 Introduction to Education  
   - 333 Adol. Growth & Development  
     (prerequisite: Gen. Psych. 133, 201)  
   - 370 School and Society  
   - 390 High School Curriculum  
   - 450 Methods of Teaching in High School  
     - or -  
   - 451 Special Methods of Teaching  
   - 480 Student Teaching  
   
   Total: 24 hrs.

2. **Two electives from the following courses:**
   - 313 Educational Psychology  
   - 343 Human Growth & Development  
   - 401 History & Philosophy of Education  
   - 402 School Organization & Administration  
   - 430 Audio-Visual Aids  
   - 440 Special Problems in Teacher Educ.  
   - 460 Evaluation & Measurements  
   
   Total: 30 hrs.

**General Courses**

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

313. **Educational Psychology.** A study of the learning process and conditions that promote learning. Prerequisite: Psychology 201. 3 hours.

401. **History and Philosophy of Education.** Modern educational practice; historical changes in instructional processes and ideas; educational beliefs and points of view; the purpose of Education in American Democracy. 3 hours.
402. **School Administration and Organization.** The American public school system, its organization and administrative units and other agencies through which it is managed, and the administrative tasks for which a classroom teacher is responsible. *3 hours.*

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

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

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

460. **Evaluation and Measurement of Pupil Progress.** Evaluation and measurement as they apply to instruction; construction of tests for use in the classroom, a survey of standardized tests and their uses. *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 201. *3 hours.*

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

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

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

301. **The Elementary School Curriculum.** Learning situations in the classroom in harmony with basic psychological principles of learning; the objectives of elementary education. *3 hours.*
310. Reading Improvement. The reading process, comprehension and speed, basic reading skills; the mechanics of reading, causes of difficulties; prevention and treatment of individual problems; and evaluation of progress in reading. 3 hours.

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

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

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

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

350. Primary Music Methods. Music techniques, teaching procedures, and the use of materials in the primary grades; for music teachers and supervisors. 3 hours.

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

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

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

SECONDARY EDUCATION COURSE DESCRIPTION

333. Adolescent Growth and Development. The adolescent, his physical, social, emotional, and intellectual development in accordance with genetic constitution and environmental forces from birth. Prerequisite: Psychology 201. 3 hours.

343. Human Growth and Development. Required of secondary education majors. Parallel to Education 141, 223. A study of the social and developmental factors underlying high school instruction. 3 hours.

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

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

433. Driver Education. For those who plan to teach driving in the public schools; a number of classes and driving demonstrations daily. No other course can be taken concurrently. The credit will be approximately 1½ hours per week of instruction. 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; cooperative learning, activities, understanding the student, television in learning, instructional planning and other new developments in teaching practices; observations and evaluations of actual classroom situations, laboratory practice within the class. 3 hours.

451. Teaching Methods in Special High School Teaching Areas. Similar to Education 141, 450 except emphasis upon the student's major teaching area; observation and evaluation of actual classroom situations required. 3 hours.
480. **Student Teaching—Junior and Senior High School.** To be eligible for student teaching the candidate must have senior rank; have a cumulative scholarship average of 2.25; have a scholarship average of 2.25 or higher in education courses with no grade in any course lower than "C"; students preparing to teach at the secondary level, a scholarship average of 2.25 or higher in required courses in the subject matter sequence with no grade lower than "C"; have completed or be in the process of completing the following courses, preferably in this order: Introduction to Education, Adolescent Human Growth & Development (prerequisite: General Psychology 201), School and Society, High School Curriculum, Special Methods or High School Methods; teach either in his major or minor teaching field; possess a desirable teaching personality, including interest in teaching, social adaptability, the ability to get along with people, responsibility and high moral standards; must demonstrate effective communicative skills in speaking and writing; be approved by the Director of Teacher Education and by the chairman of his department. The work consists of planning and teaching under supervision in the junior or senior high school one-half day, five days per week for one quarter and an average of one hour per week with supervision on the campus. **9 hours.**

**English, Speech, and Theatre**

*(Department 112)*

**Associate Professors Dornbusch (Chairman), Bartlett, Bennett, Hastings, Morton, Price; Assistant Professors Belch, Davis, Gerdes, Jacob, Spelman; Miss Barlow, Miss Hunt, Mr. Myers, Mrs. Rodgers**

**Objectives**

The courses in Literature, Language, Speech, and Theatre are designed to acquaint the student with the great ideas and traditions in the literature of the Western World so that he may read with understanding and discrimination, to develop the student's skill in clear and effective writing and oral communication, to give the student a fundamental knowledge and understanding of the nature of language, to provide the opportunity for the student to experience a variety of speech and theatre activities, to offer advanced work to those who plan to teach in the public schools and to those who plan to continue specialization in graduate study.
CLASSIFICATION OF COURSES

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.

MAJOR FIELDS

The Department of English, Speech, and Theatre offers three majors as follows:

**English:** For a major in English the following courses are required: 200, Critical Modes; 201-202-203, Introduction to English Literature; 211-212-213, Introduction to American Literature (For majors, 201-202-203 are prerequisites for 211-212-213); 311 or 312 or 313, Shakespeare and His Age; four of the following period courses: 321, Milton and the Seventeenth Century; 322, Restoration and the Eighteenth Century; 323, The English Romantic Movement; 324, The Victorian Period; 325, Modern Poetry.

Also required are 350, The English Language; 410, Chaucer and His Age (prerequisite: 350); 440, The Senior Seminar.

These requirements meet the 45 hour minimum for a major in English. Majors are also encouraged to take up to 15 hours of electives in English (a maximum of 60 hours in English). Two years of a modern foreign language and 1 year of English History, preferably taken in the major's junior year, are also required.

The following courses in Speech and Theatre are strongly recommended for students preparing to teach: Speech 271 or 272, Public Speaking; Speech
261, Voice and Diction; Speech 262, Oral Interpretation; Theatre 281, Acting Fundamentals.

English 151-152-153 does not count toward a major. No course with a grade below C may be counted toward the major.

**Speech**: For a major in Speech, the following courses are required: Speech 272 and 273, Public Speaking; Speech 371, Discussion, 372 Debate and 373 Advanced Persuasive Speaking; Speech 261, Voice and Diction; Speech 262, Oral Interpretation; Speech 470, Speech Seminar; English 350, The English Language.

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

**Theatre**: For a major in theatre the following courses are required: Speech 261, 262 (Voice and Diction and Oral Interpretation); Speech 271 or 272 (Public Speaking); Theatre 291, 292, 293 (Introduction to Theatre and Theatre History); Theatre 281 (Acting Fundamentals); Theatre 384, 385, 386 (Fundamentals of Directing, Stagecraft, and Stage Lighting); Theatre 481, 482, 483 (Scene Design, Advanced Directing, and Problems in Production); and Theatre 490 (Seminar in Theatre). Electives must be selected from Speech and Theatre to complete 45 hours. In addition to the minimum requirement of 45 hours, nine hours of dramatic literature beyond the liberal arts general literature requirement and two years of a modern foreign language are required. No course with a grade below C may be counted toward the major.

**ENGLISH COURSES**

151-152-153. **Composition.** 151—A programmed review of fundamentals and techniques in exposition and argumentation; 152—studies of and practice in descriptive, narrative, and critical writing; 153—techniques in research and the research paper. **9 hours.**

200. **Critical Modes.** An introduction to critical approaches to literature, applied to specific works in the various genres. **3 hours.**

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

241-242-243. **JOURNALISM.** Basic instruction in newspaper organization, procedures, and techniques. Students work closely with or are members of the staff of the *Northern Review*. Three hours credit per quarter for students who participate in the laboratory Sunday at the printer's, two hours for those who do not. 9 hours.

253. **VOCABULARY STUDY.** A systematic study of English vocabulary enlarging and enriching the student's store of words and developing his precise and effective use of them; 3 class hours per week. 2 hours.

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**PREREQUISITES FOR ADVANCED LITERATURE 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 Austin; 302—from Dickens to Joyce. 6 hours.

303. **TWENTIETH CENTURY AMERICAN FICTION.** A study of the development of the American novel after World War I, with emphasis on the major novelists. 3 hours.

304. **THE SHORT STORY.** A study of the works of the master short story writers; understanding and appreciation of the short story as a literary form, its techniques, its advantages and limitations as a means of artistic expression. 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 the Seventeenth Century.** The thought of Milton as expressed in his epic, dramatic, lyric, and polemical writings; his relation to the English Renaissance, the Puritan Commonwealth, and the Age of Reason; and background study including Bacon, Donne, Herbert, Vaughan, Browne, Pepys, Bunyan, and Locke. *3 hours.*

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.*

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.*

324. **The Victorian Period.** A study of typical Victorian attitudes, conflicts, and conditions as reflected in the major prose and poetry of the Age. *3 hours.*

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.*

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.*

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


340. **Creative Writing.** The expression of thought and feeling; analysis in conference and class discussion of work by students. *3 or 6 hours.*

350. **The English Language.** A study of the historical development of the English language and of modern linguistics. *3 hours.*
410. **Chaucer and His Age.** A chronological study of Chaucer's life in relation to his literary development; the chief literary forms of the Middle Ages with special reference to the Medieval Romance; skill in reading Middle English; representative types from *Canterbury Tales, The Book of the Duchess, The House of Fame, The Parliament of Fowls, Troilus and Criseyde*, and the best of the short poems. 3 hours.

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

**Speech Courses**

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

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

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

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

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

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

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

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

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

371. **Discussion.** Group discussion; cooperative problem solving and deliberative thinking. An opportunity to participate in and lead discussion is provided. Prerequisite: Speech 271 or 272. 3 hours.
372. Debate. Argumentative speaking and debate; proposition analysis, use of evidence, elementary logic, and case construction. Prerequisite: 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. Prerequisite: 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 recommendation by the member of the department who will supervise the project.

Radio Courses

290. Radio Activities. Participation in the current campus radio facilities. 30 hours time per quarter is required for 1 credit hour. A maximum of six quarters. 1 hour.

294. Introduction to Radio. The history of radio and the fundamental techniques of radio broadcasting; intensive study and practice. 3 hours.

Theatre Courses

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

281. Acting Fundamentals. The modern mechanics and conventions of acting with both oral and written practice. Prerequisite: Consent of Instructor. 3 hours.

291. Introduction to Theatre. An audience centered survey of theatrical theories and techniques establishing standards of judgment and appreciation. 3 hours.

292, 293. Theatre History. The theatre from its beginnings in primitive man to the present; the development of the physical theatre and the audience of the period. The first term covers the period from the beginnings to the eighteenth century, the second term from the eighteenth century to the present, with attention also to the oriental theatre. 6 hours.
382. Advanced Acting. The theories and styles of period acting with both oral and written practice. Prerequisite: Theatre 281. 3 hours.

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

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

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

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

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

482. Advanced Directing. A study of the fundamental theories of period directing applied to the production of either a play not previously produced or a cutting of a three act classic drama (Greek, Roman, Shakespearian, or classic French or German) to one-act proportion for public production. Prerequisite: Theatre 481. 3 hours.

483. Problems in Production. A composite study of the problems in the organization of the dramatic production; the duties of the stage manager, business manager, producer-director, costume master, and the scene and light designer. Prerequisite: Theatre 482. 3 hours.

490. Seminar in Theatre. Upon the recommendation of the theatre faculty a student may select a seminar in one of the following areas:

Directing: The directing of a three-act play for presentation on the major bill. Prerequisites: Assisting the director of theatre on one major bill production, serving as stage manager, lighting technician, house manager, and costume master and Theatre 483.
Acting: The production of a monodrama for presentation on the major bill. Prerequisites: Speech 261, 262, and 263 and Theatre 281, 382 and roles in eight productions on the major bill.

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

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

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

FOREIGN LANGUAGES

(Department 113)
Professor Schmitz, Associate Professor Gminder, Assistant Professors Elias, Judd; Dr. Espino, Mrs. Rassoul

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

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

The Thomas R. Schoonover Laboratory (with master-tapes, pre-recorded tapes and discs) provides opportunities for practice with tape recorders in 24 semi-soundproof booths, and extends the contact of the student with a living language, aiming at a maximum of active participation; offering recorded materials which have been carefully prepared as an adjunct to class work, interrelated and 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 should begin with an intermediate course; those with more than two years should take a placement examination, and may be permitted to take a 300 level course, if approved by the head of the foreign language department.

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

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

All students majoring in a foreign language are urged to spend their junior year studying in a foreign country under conditions compatible with their major and conducive to gaining spoken and written mastery of the language studied. The Department of Foreign Languages will provide assistance in placing the student in a foreign university.

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

FR ENCH

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.

slides and motion pictures with French sound tracks. *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; interrelationships of these arts; moving pictures, color slides, film strips, and recordings. The course is conducted entirely in English and counts toward the Humanities requirement of two quarters in Art, Music, Theatre, or Foreign Cultural Developments. Does not count toward a departmental major in French. Open to all students. *3 hours.*

311, 312, 313. **French Conversation and Composition.** To develop a useful command of the language in both its spoken and written forms; readings, slides, recordings, current periodicals and realia are used to stimulate conversation about a variety of topics useful to the student or traveler in France; and advanced study of grammatical and phonetic problems aimed at perfecting clarity and accuracy of expression. *Three class periods and two hours of scheduled laboratory practice per week.* Prerequisite: 211-212-213. *12 hours.*

314, 315, 316. **Survey of French Literature.** A study of the main currents and characteristic monuments of French literature. Class discussions based on the reading of representative French masterpieces. Lectures and reports. Prerequisite: 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 entirely in French, is required of all French majors. Prerequisite: French 311-313, or consent of instructor. *9 hours.*

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

**German**

121-122-123. **Elementary German.** To develop the ability to understand, speak, read, and write German; functional, rather than formal grammar; early and fluent speaking; elementary reading based on German life, customs, and manners. *Three class hours and two periods of scheduled laboratory practice a week.* *12 hours.*
221-222-223. **Intermediate German.** Review of the fundamentals of grammar, pronunciation, vocabulary and idioms; conversational practice and composition based on short stories, plays, and poetry; occasional lectures on 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; practice in intensive and extensive reading of material; special needs and interests 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; interrelationships of these arts; moving pictures, color slides, film strips and recordings. The course is conducted entirely in English and counts toward the Humanities requirement of two quarters in Art, Music, Theatre, or Foreign Cultural Developments. Does not count toward a departmental major in German. Open to all students. *3 hours.*

321, 322, 323. **German Conversation and Composition.** A wide range of topics dealing with Germany 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. Also included is 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, reading of representative masterpieces, reports. Prerequisite: German 221-223; 321, 322, 323, or the consent of the instructor. *9 hours.*

421, 422, 423. **Deutsche Kulturgeschichte.** The course, given entirely in German, presents an integrated picture of the political, economic, social and cultural forces which have shaped Germany, and is required of all German majors. Prerequisite: German 221-223; 321, 322, 323, or consent of instructor. *9 hours.*
420. German Seminar. For seniors majoring in German. May be repeated up to 6 hours. 3 hours.

Spanish

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

241-242-243. Intermediate Spanish. To improve aural-oral skills; a systematic review of the fundamentals of grammar and pronunciation; conversational practice and composition based on short stories, plays and poetry, and on current periodicals; occasional lectures in Spanish on Spanish life, history, arts, crafts, and civilization, illustrated with film strips, slides, photographs and 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, and the interrelationships of the arts; photographs and reproductions, color slides, film strips, motion pictures, recordings. This course counts toward the Humanities requirement of two quarters in Art, Music, Theatre, or Foreign Cultural Developments. Does not count toward a departmental major in Spanish. Open to all students. 3 hours.

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

344, 345, 346. Survey of Spanish Literature. A study of the background, main trends and chief authors in the literature of Spain from the beginnings to the present, with special emphasis on the Golden Age. Discussions, readings
and reports. 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 with relation to their European background. Prerequisite: Spanish 241-243, or the consent of the instructor. 9 hours.

441, 442, 443. CIVILIZACION HISPANICA. This course, given entirely in Spanish, presents an integrated picture of the political, economic, social, geographical and cultural forces which have shaped Spain and Hispanic America, and is required of all Spanish majors. Prerequisite: Spanish 341, 342, 343, or consent of instructor. 9 hours.

440. SPANISH SEMINAR. For seniors majoring in Spanish. May be repeated up to 6 hours. 3 hours.

RUSSIAN

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

231-232-233. INTERMEDIATE RUSSIAN. Review of the fundamentals of grammar and pronunciation; conversational practice and reading based on short stories, plays and poetry; 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 and interests 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, with special emphasis on the interrelationships of these arts; moving pictures, color slides, film strips and recordings. The course is conducted entirely in English and counts toward the Humanities requirement of two quarters in Art, Music, Theatre or Foreign Cultural Developments. Does not count toward a departmental major in Russian. Open to all students. 3 hours.
331, 332, 333. **Russian Conversation and Composition.** A wide range of 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 to acquaint the student with Russian life, customs and geography. Films, slides and current Soviet periodicals are used and discussed. *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. Class discussions based on the reading of representative Russian masterpieces. Lectures and reports. 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. A survey of Russian political and cultural history from the foundation of the Russian State to the fall of the Tsarist regime. The historical background of the Russian Revolution of 1917 and the basic features of Marxism-Leninism, followed by a comprehensive study of the political, economic and cultural aspects of Soviet life. The course is given in Russian, illustrated by slides, films and music recordings, and is required of all Russian majors. Prerequisite: Russian 231-233, 331-333. *9 hours.*

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

**CLASSICAL GREEK**

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

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

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

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

HISTORY AND POLITICAL SCIENCE

(DEPARTMENT 132)

PROFESSORS HILLIARD (Chairman), BINKLEY, DARLINGTON, MILNAR, ASSISTANT PROFESSOR SOBERS; DR. UVEGES, MR. BARKER, MRS. HAMMOND

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

HISTORY

The most appropriate sequence of courses for a field of concentration in history is History of Western Civilization 111, 112, 113; History of the United States 211, 212, 213; History of England 321, 322, 323; Recent American History 361, 362; or Constitutional History of the United States 331, 332; and Recent European History 371, 372, 373. In addition to the 45 hours required for the major in History, the student must complete nine hours in American Government.

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

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

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

211. HISTORY OF THE UNITED STATES TO 1850. 3 hours.
212. **History of the United States to 1900.** 3 hours.

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

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

321. **English History to 1603.** 3 hours.

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

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

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

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

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

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

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

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

351, 352. Ancient History. The development of civilization from prehistory to the fall of Rome. Emphasis is placed upon the early pre-Greek Oriental civilization and the cultural and political contributions of the period. 6 hours.
353-354. L A T I N A M E R I C A. The conditions in Spain and Portugal leading to Latin American colonization, and the growth of the cultural and political institutions of Latin America. The struggle for independence, and the rise of the modern Latin American Republics. 6 hours.

361, 362. R E C E N T A M E R I C A N H I S T O R Y. An investigation and intensive study of some of the major movements of United States history since 1900. Pre-requisite: History 211, 212, 213, or consent of the instructor. 6 hours.

371-372-373. R E C E N T E U R O P E A N H I S T O R Y. Europe and its relations with the rest of the world since 1914: imperialism; the alliance system; World War I; the war debt and reparations problems; the rise of the Soviet Union and the fascist powers; the great depression relations with the Middle-East and the Far-East; World War II; the Cold War. Prerequisite: History 111, 112, 113. 9 hours.

381. T H E W E S T W A R D M O V E M E N T I N T H E U N I T E D S T A T E S. Territorial expansion from colonial times to the present; Indian relations, land policies, transportation and trade. 3 hours.

382. T H E W E S T W A R D M O V E M E N T I N T H E U N I T E D S T A T E S. A continuation of the first course; the advance of the frontier. The development of sectionalism; the influence of the West on American ideals and institutions; the Trans-Mississippi West. Prerequisite: History 211, 212, 213 or consent of the instructor. 3 hours.

400. H U M A N G E O G R A P H Y. The interaction of man and his physical environment. 5 hours.

411, 412, 413. R U S S I A N H I S T O R Y. Russia from the time of Peter the Great to the present. The courses place emphasis upon the economic and social development, political and religious traditions, the nationalist, liberal, socialist and revolutionary developments, the post-war developments of the U.S.S.R. and the role of Russia in European affairs. 9 hours.

433. G L O B A L G E O G R A P H Y. World geography; relationship of the physical environment to the economic, social and political problems of mankind. 3 hours.

440. H I S T O R Y P R O B L E M S. Individual investigation on a specific problem. Open to qualified seniors majoring in history. 3 hours.
POLITICAL SCIENCE

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

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

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

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

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

356. American Political Theories. The development of American political theories from the colonial period to the present with a view to providing a basis for rational approach to the solution of our present political problems. Prerequisite: Nine hours of Political Science or the consent of the Instructor. 3 hours.

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

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

372. International Organization. The principles underlying the ideas of international organization. A comparative analysis of the objectives, structure, machinery, agencies, and procedures of the League of Nations, the United Nations. Brief consideration will be given to present functional and regional organizations. 3 hours.
373. International Law. Historical and theoretical development of the law governing the relationship between states, its nature, sources and applications; international agreements, community of nations, territory, nationality, jurisdiction, state responsibilities, and the laws of force and war. 3 hours.

383. European Political Theories. The development of political philosophy from the period of Ancient Greece to modern times. Prerequisite: Political Science 201, 202, 203, or the consent of the Instructor. 3 hours.

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


422. Foreign Policy of the Soviet Union. The constant factors in Russian foreign policy. Policy of the early years as affected by Marxian ideology, internal condition and foreign interference. Period of truce and limited cooperation with Western Powers. Second World War and aftermath. 3 hours.

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

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

INDUSTRIAL ARTS

(Department 142)

Associate Professor Kain (Chairman), Assistant Professor Bowling

The technological world of the present and future demands a knowledge of materials, products, tools and machines, skills and occupations in order that one may more intelligently interpret the economic and social environment of which he is a part.
The principal objective of the Department of Industrial Arts is to provide a basic education in applied arts and sciences by encouraging the growth of an understanding of manufacturing, production and consumption, utilizing a variety of materials, processes, operations and procedures.

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

This department offers several courses that are of interest and value to both men and women students concentrating in other fields. The recommended courses are: 113 Drawing, 200 Arts and Crafts, 210 Handicrafts for Teachers, 241 Finishing Methods and Materials, 311 Graphic Arts, 323 Lapidary and Jewelry, 430 Photography, 440 Special Problems, and 460 Industrial Materials and Processes. These courses have no prerequisite.

Students concentrating in Industrial Arts are required to complete a minimum of 83 quarter-hours in the areas of drawing, woodworking, metalworking, 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.

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.
### INDUSTRIAL ARTS CURRICULUM FOR MAJORS

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<td>School &amp; Society 370</td>
<td>Speech 271</td>
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<td>Laboratory Plan. 412</td>
<td>Student Teach. 480</td>
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<td>Electives in Educ. 6</td>
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101. **Industrial Arts Orientation.** An introduction to Industrial Arts, presenting a basic coverage of the philosophical origins and contemporary practices. The functions of Industrial Arts and insights into the profession are exemplified through public school visitations and visiting speakers. The fundamental procedures, operations, and the special equipment for each of the several areas of Industrial Arts are briefly explored through laboratory activities. 3 hours.

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

113. **Drawing.** To create an awareness of the value of good design as applied to fabrication and construction, using typical industrial materials; design (as applied to a particular function and material), response of the individual; good design as it exists in textiles, furniture, sculpture, graphics, paintings, interiors and architecture, in addition to its application to the manufacture of industrial products. 3 hours.

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

200. **Arts and Crafts.** Laboratory experiences in working with a large selection of craft materials: copper, brass, aluminum, wood, plastics, leather, gemstones, textiles, reed, and others. The essentials of design and ornamentation as applicable to the material; handicraft techniques, tools and procedures. 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, both elementary and secondary, to the basic hand tools and their proper manipulation in simple constructional activities; exemplary projects are chosen to meet typical units of study, their construction utilizing available and inexpensive materials. 3 hours.

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

221, 222. Ceramics. Introduction to pottery making; experiences in forming, glazing and firing; hand building and use of the potter’s wheel; introduction to the art phases of the ceramic field with emphasis on the decorative processes; mold making and casting of ceramic ware. Offered in the Department of Art. 6 hours.

231. Furniture and Cabinet Construction. Advanced cabinetry procedures, traditional and contemporary period designs; hand and machine-tool techniques are employed in joinery and decorative treatments which feature carving, turning, veneering, inlaying, fluting, and associated styling elements. At least one major project is required for the completion of this course. Prerequisite: 113 Drawing, 101 Industrial Arts, 112 Wood Technology. 3 hours.

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

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

321. Metalwork Technology. Fundamentals of general metalwork; layout and pattern drafting, bending, forming, seaming, soldering, resistance and oxyacetylene welding and machining; minor problems in 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; knowledge of jewelry materials and design; working with natural and synthetic stones including the sawing, shaping, polishing, and mounting of jewelry stones. 6 hours.

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

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

402. **Fundamentals of Electricity & Electronics.** The principles of electricity: magnetism, current, Ohm’s Law, circuitry, heating effects, and power; practical calculations and the application of principles 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; the drawing of floor plans and writing of specifications. Prerequisite: Same as 323, Industrial Arts Organization and Methods. 3 hours.

423. **Industrial Arts Organization and Methods.** A professional course in the methods of teaching Industrial Arts; objectives, preparing lesson plans, organizing courses, laboratory procedures, instructional materials, and administrative practices. Visitations are made to representative high school laboratories. Open only to students having 30 hours or more of Industrial Arts courses. 5 hours.

430. **Photography.** Proper picture taking techniques; of photographic composition, camera types and accessories, photographic optics, and laboratory methods and materials; dark room practices in developing and printing negatives. 3 hours.
Founders Hall, Freshmen Men’s Residence

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

451. **Automotives & Power Mechanics.** The construction and operating principles of the modern motor vehicle; present-day methods of maintaining and repairing automobiles as determined through scientific methods of diagnosing troubles. 5 hours.

460. **Industrial Materials and Processes.** Industrial materials, their origins, sources, characteristics, uses, and 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 to understand the processing and utilization of materials. 5 hours.

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

PROFESSOR WILFRID WILSON (Chairman), ASSISTANT PROFESSORS BENNETT, KUHNS, LHAMON, ROIDER, SHULT; MRS. GREEN

Mathematics is the language of science; it is also a tool of engineering, business, and industry; and, being a culture of itself, it is allied with the arts and the humanities.

Students majoring in Mathematics for the Bachelor of Arts degree or for the Bachelor of Science in Education degree, complete a minimum of 45 quarter hours of work in this department. Twenty hours of this total are pursued generally during the Freshman and Sophomore years. The remaining 25 hours minimum of the total are courses more advanced than course 253 and must include course 451. Also required are 15 hrs. in the Department of Physics.

Students majoring in Mathematics for the Bachelor of Science degree complete a minimum of 80 hours in the Division of Natural Sciences. Forty-five hours of the work toward this major comprise the same courses as outlined above except the last 25 hours must include both course 451 and course 452. The remaining 35 hours consist of Physics 241, 242, 243; Chemistry 131, 132, 133, and eight additional hours of electives from advanced courses in Mathematics, Physics, Chemistry, or Biology.

All courses of study leading to a Mathematics major for any of the three degrees referred to must include two years of a foreign language.

All students graduating from the College of Liberal Arts must have completed at least one year of Mathematics. This minimum requirement may be met by completing certain sequences such as, but not restricted to, courses 111, 112, 113 or 151, 152, 153 or 181, 182, 183. Courses for Freshmen are outlined on the basis of the student’s achievement in high school and in the college entrance examinations. Advanced placement of students in the Department of Mathematics is encouraged. Students majoring in the Physical Sciences may, at the discretion of the chairman, enroll for courses 241, 242, 243 instead of 151, 152, 153.

Course 099 is a preparatory course and does not count for college credit. The following named courses do not count toward a major in Mathematics: 111, 112, 113, 151, 152, 181, 182, 183.
### BASIC CURRICULUM FOR CONCENTRATION IN MATHEMATICS

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</table>

**COURSES OF STUDY**

099. **Preparation for College Mathematics.** Review of arithmetic, transition to algebra, factoring, fractions, linear and quadratic equations, exponents and radicals. 9 hours.
111-112-113. **Fundamental Mathematics.** A one year terminal course. Logic in mathematics and science, the number concept and number system, arithmetic, the logic of algebra, exponents and logarithms, definitions and use of trigonometric functions, introduction to analytic geometry, various geometries, some classical problems. Prerequisite: One year of high school algebra. 9 hours.

151. **College Algebra.** A brief refresher through quadratic equations in one unknown, simultaneous quadratics, inequalities, ratio, proportion, variation, progressions, theory of equations, determinants, compound interest and annuities, permutations, combinations, probability, binomial theorem, mathematical induction. Prerequisite: 1½ units high school algebra, 1 unit high school plane geometry. 5 hours.

152. **Trigonometry.** Trigonometric functions and their graphs, functions of sums and differences and multiples, equations and identities, formulas for triangle solution, theory of logarithms, calculations using logarithmic tables, complex numbers, DeMoivre's theorem and applications, introduction to spherical trigonometry. Prerequisite: Mathematics 151 or equivalent preparation. 5 hours.

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

163. **Analytic Geometry and Calculus (Formerly 141).** For students well prepared in algebra and trigonometry who need a course combining the essentials of analytic geometry and calculus. The course includes study of the properties of lines and conic sections; derivatives of trigonometric, inverse, logarithmic, and exponential functions; evaluation of integrals; and applications. Prerequisite: Mathematics 151 and 152 or equivalent. 5 hours.

181. **Mathematics of Finance, I.** Selected portions of arithmetic, elementary algebra and college algebra, including logarithms, the binominal theorem, and progressions. Prerequisite: 1 unit high school algebra. 5 hours.

182. **Mathematics of Finance, II.** The mathematical tools of business; simple and compound interest, discounts, installment buying, depreciation, bonds, amortization, sinking funds, annuities, life insurance. Required of business administration and secretarial students. Prerequisite: Mathematics 181 or equivalent. 3 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, t test, analysis of variance, mean, correlation, methods of sampling. Prerequisite: Mathematics 111 and 112 or 123, 151, or 181. *3 hours.*

241, 242, 243. **Calculus and Analytic Geometry.** The content of Mathematics 153, 251, 252, 253, with the exception of series, is for freshmen majoring in physical sciences and may be taken with (the approval of the department chairman), and for students in the four-year engineering program. Prerequisite: Determined by the chairman or the advisor. *15 hours.*

251. **Calculus.** Algebraic and calculus aids to graphing, families of curves, the logarithmic function and its derivatives, the exponential function and its derivative, the hyperbolic functions and their derivatives, the logarithm function defined as an integral, trigonometric integrals, trigonometric and other substitutions in integration, partial fractions, integration by parts, numerical methods for definite integrals, the concepts of limit and continuity, theorems of mean value, theorems on existence and evaluation of definite integrals, the fundamental theorem of the integral calculus. Prerequisite: Mathematics 153. *5 hours.*

252. **Calculus.** Maxima and minima, related rates, differentials, parametric representation, arc length, curvature, more on limits of sums, work, line integrals, first moments, moment of inertia, improper integrals, polar coordinates, solid analytical geometry, vector product, partial derivative and its geometric interpretation. Prerequisite: Mathematics 251. *5 hours.*

253. **Calculus.** Total differentials, directional derivatives, normal lines and tangent planes, chain rules for partial derivatives, higher order partial derivatives, implicit function theorems, volumes, areas of surfaces, iterated and multiple integration, cylindrical and spherical coordinates, polynomial approximation of functions, convergence theorems for infinite series, Taylor's theorem, the Taylor series expansion for a function, applications. Prerequisite: Mathematics 252. *5 hours.*

300. **Analytic Geometry of Space.** Theory of matrices and determinants, systems of linear equations, equations of curves and surfaces, transformations of coordinates, classification of quadric surfaces. Prerequisite: Mathematics 253 or 341. *4 hours.*
305. **Electronic Computer Concepts.** Nondecimal systems, Boolean algebra, introduction to several computer languages, familiarization with several types and makes of computers, effort being made to show the student how the computer performs its logic. Prerequisite: Mathematics 253 or 341. 4 hours.

310. **College Geometry** (Formerly 302). Points, lines, and circles related to a triangle, vector geometry, centers, harmonic properties, inversion, projection, introduction to non-Euclidean geometry. Prerequisite: Mathematics 253 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 253 or 341. 3 hours.

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

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

351. **Differential Equations I and Vector Algebra.** Ordinary differential equations of the first order, linear differential equations with constant coefficients, simultaneous linear differential equations, applications to mechanical and electrical circuits. Vector algebra. Prerequisite: Mathematics 253. 5 hours.

352. **Differential Equations II and Finite Differences.** Fourier series, finite differences, Leplace 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 123, 341 or 123, 351. 5 hours.

382. **Advanced Statistics.** Fundamental statistical aspects such as variability, multiple correlation, measures of functions of distribution, control charts, tests for significance, regression analysis, analysis of variance, probability, sampling. Prerequisite: Mathematics 253 or 341. 4 hours.
440. **Special Problems.** Independent study in special topics. By arrangement. 1-3 hours.

443. **Introduction to Topology** (Formerly 414, 441). Intrinsic qualitative properties of sets of points. Topologies, topological spaces, neighborhoods, cluster points, homeomorphisms, connected spaces, compactness, metric spaces. Prerequisite: Mathematics 253 or 341 and 451. 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 253 or 341. 4 hours.

452. **Advanced Calculus I.** An intensive study of the concepts of limit and continuity, uniform continuity, extended law of the mean, indeterminate forms, fundamental theorem of integral calculus, improper integrals, the Riemann-Stieltjes integral, limit and continuity theorems for functions of several variables, Duhamel's principle, envelopes, Jacobians, Lagrange multipliers, Leibnitz's rule, functional dependence. Prerequisite: Mathematics 253, knowledge of structure of real number system, some basic topological concepts. 3 hours.

453. **Advanced Calculus II.** Intensive study of infinite series, with emphasis on theorems and their proofs, Taylor series for several variables, uniform convergence and uniform limits, Weierstrass M-test, Cauchy criterion, Abel's test, gamma and beta functions, Fourier series, Bessel's inequality, Parseval's equation, Riemann-Lebesgue theorem, vector analysis, line and surface integrals, Green's theorem, Stoke's theorem, Green's identities, harmonic functions. Prerequisite: Mathematics 452. 3 hours.

**MUSIC**

(Department 114)

Professor Roider (Chairman), Assistant Professors Byrd, Sonntag, Weitz; Mr. Anderson, Mrs. Gminder, Mr. Lasko (on leave), Mr. Grigsby (on leave)

**Requirements for Degrees:**

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

These are in accordance with the published regulations of the National
University Marching Band

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>
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<th>Course</th>
<th>Hours</th>
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<tr>
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<td>Counterpoint, Choral or Instrumental Arranging</td>
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<tr>
<td>Form and Analysis</td>
<td>3</td>
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<tr>
<td>History of Music</td>
<td>9</td>
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<td>Applied Music</td>
<td>36</td>
</tr>
<tr>
<td>Conducting</td>
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<tr>
<td>Participation in a performing group</td>
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<td>Senior Recital</td>
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**BACHELOR OF SCIENCE IN EDUCATION**

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<td>Form and Analysis</td>
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<tr>
<td>Counterpoint, Choral or Instrumental Arranging</td>
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<td>History of Music</td>
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<td>Applied Music</td>
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<td>Class Voice</td>
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<tr>
<td>Music Teaching Methods</td>
<td>6</td>
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<tr>
<td>Participation in a performing group</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
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</tbody>
</table>

(Required courses in Education, including Student Teaching are listed in the Department of Education section of the catalog.)
APPLIED MUSIC

FEES:

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

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

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

020. VOICE. To establish correct physical and mental poise, the principles of breathing and breath control, proper diction and articulation using the best of various methods from the Italian classic of the Bel Canto period to the modern scientific theories; repertoire, interpretation, and presentation; presentation of vocal works before an audience through recital and student assembly. Students are encouraged to study songs in the modern languages, Italian, French, and German. 1—2 hours per quarter.

021. PIANO. Individual instruction in piano playing; technical studies and selections to develop the student’s ability to recreate the desire of the composer; use of the works of the masters through all grades; recitals and public appearances to gain poise and develop self-assurance. 1—2 hours per quarter.

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

023. STRINGS. 1—2 hours per quarter.

024. WOODWINDS. 1—2 hours per quarter.

025. BRASSES. 1—2 hours per quarter.

026. PERCUSSION. The fundamentals; technical facility; intonation, tone production, and style necessary to artistic performance and interpretation. The course depends upon the individual needs and qualifications of the student. 1—2 hours per quarter.
035. **Chorus-Choir.** Students of any college of Ohio Northern University interested in singing in the Chorus-Choir have the opportunity to try out for this organization. Music of all types, accompanied and *a cappella*, is used throughout the year. Sacred and secular music for concerts at the University and outside the community are a part of the program. Up to 6 hours credit are permitted for non-music majors. **1 hour per quarter.**

040. **Band.** All University students who play band instruments are given the opportunity to play in the University Band. A wide variety of material is used throughout the year. The Band appears in concert as well as at many school and community functions. Band members may participate in woodwind and brass ensembles. Up to 6 hours credit are permitted for non-music majors. **1 hour per quarter.**

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

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

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

101-102-103. THEORY. The singing, reading, and writing of scales, intervals, triads and simple part-writing from melodies and figured bases. As the course progresses, seventh chords, modulation and the non-harmonic tones are added. 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 elementary classroom teacher—grades 4-6. 3 hours.

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

211. Theory. Altered chords, non-harmonic tones, chromatics, and advanced modulation are added to the previous year of the Structure of Music. Analytical technique of music compositions and the study of Musical Form from the motive and song-form to the sonata and contrapuntal forms. 4 hours.

301-302. Conducting. Courses in principles of conducting, concluding with conducting choral, band and orchestra scores. 4 hours.

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

312 or Ed. 360. Intermediate Music Methods (Music Education Majors). The study of music techniques, teaching procedures, and the use of materials and instruments in the intermediate grades; designed for music teachers and supervisors. 3 hours.
313 or Ed. 450. **Junior and Senior High School Methods** (Music Education Majors). The study of music techniques, teaching procedures and the use of materials and instruments in the junior and senior high school; the study of band, orchestra, and chorus organization and management, high school repertoire, competition—festival and public performance participation. **3 hours.**

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

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

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

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

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

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

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

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

442. **Teaching of Woodwind Instruments.** 2 hours.

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

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

(DEPARTMENT 115)
PROFESSOR TINSLER (Chairman); ASSOCIATE PROFESSOR HINDERLITER; ASSISTANT PROFESSORS Hodges, Smith

FIELD OF CONCENTRATION (Interdisciplinary major)

A field of concentration of 52 hours, exclusive of the core course, 231-232-233, required of all students, constitutes a major in philosophy and religion, and shall include the following courses: Bible History, Rel. 254-255-256; Logic and Introduction to Philosophy, Philosophy 234-235-236; St. Paul and Church History 351-352-353; and the History of Philosophy, Philosophy 331, 332, 333, together with General Psychology and a basic course in Sociology, Problems in Religion 450, or Problems in Philosophy 430, in the Senior year; plus electives in Philosophy or Religion or both to total at least 52 hours.

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

PHILOSOPHY

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

234. Logic. A study of the principles and methods of reasoning with the purpose of improving skill in 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—its living issues—by means of firsthand acquaintance with the writings of prominent 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 PERIOD.

333. THE MODERN PERIOD, INCLUDING ANALYTICAL, POSTIVIST 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, beginning with C. S. Peirce and including W. James, J. Dewey, G. Santayana, A. N. Whitehead and some influential 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 and methods used by historians in their writing of history. Critical discussion of the suggested theories of the meaning of recorded events of human social development. 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, instead, 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 in the Church from the Apostolic Age to the Reformation and their relation to the course of general history. 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 and continue their peculiar contribution to Christianity in its current phases. 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, types of activities, professional and lay leadership, missionary outreach, the ecumenical movement, social concerns, program building, 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.** The theories of value in the field of conduct which have been recognized as "Christian ethics," with special attention to the presuppositions which underly it. Ethics relating to the individual, the family, society, economics, the state, international relations, war and the like will be studied in the light of the Christian presuppositions. Prerequisite: Same as 452. 3 hours.

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

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

**HEALTH AND PHYSICAL EDUCATION**

(Department 143)
Professor Lamb, Associate Professor English (Chairman), Assistant Professors Roberson, Banks, Michael; Mrs. Ludwig, Mr. Stahl

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

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

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

(Curriculum for Majors)

### FIRST YEAR

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<tr>
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<td>English 151</td>
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### SECOND YEAR

- Physiology 331 | 4           | Physiology 332 | 4           | Body Mechanics 223 | 3           |
- †Amer. Lit. 211, or Eng. Lit. 201 | 3           | †Amer. Lit. 212, or Eng. Lit. 202 | 3           | †Amer. Lit. 213, or Eng. Lit. 203 | 3           |
- Math 111       | 3           | Math 112      | 3           | Math 113           | 3           |
- Psychology 201 | 5           | Speech 271, ’72, ’73 | 3           | Theatre 291 or     | 3           |
- P.E. Methods 201a | 1           | P.E. 200      | 3           | Music 200          | 3           |
- P.E. 202a      | 3           | P.E. 202a     | 3           | First Aid 112      | 3           |
-                | 16           |               | 16           | P.E. 203a          | 1           |

†300 level Literature courses may be substituted in some cases.

### THIRD YEAR

- P.E. 301 (Princ. Meth. Org. & Admin.) | 5           | P.E. 302      | 3           | P.E. 303           | 5           |
- Coaching 321  | 3           | Coaching 322  | 3           | Coaching 323       | 3           |
- Phil. & Relig. 231 | 3           | P. & R. 232   | 3           | P. & R. 233        | 3           |
- Education 333 | 3           | Education 370 | 3           | Education 390      | 3           |
- Social Study  | 3           | Social Study  | 3           | Social Study       | 3           |

|                | 17           |               | 17           | 17                |

### FOURTH YEAR

- 9 Hours of Ed. 480 (Student Teaching for Sec. Ed.)
- OR 12 Hours of Ed. 480 (Student Teaching for Special Certificate)
- 3 Hours of Education 450 or 451
- 3 Hours of Corrective Gym
- 6 Hours of Education electives chosen from the following:
  - Education 312, 401, 402, 430, or 440
- Electives to round out required hours each quarter.
In as much as requirements are high for State Certification, it is recommended that as many electives as possible be taken in fields outside its department.

REQUIRED COURSES

Physical Education two hours a week. One credit each quarter for the first six quarters.

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. Women—A course in natural gymnastics including games and sports in season, dancing. 1 hour each.

Homecoming Football Action
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 horseshoe.

Professional Curriculum for Teachers

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

In addition to the requirements listed below each major in the health and physical education program must be affiliated in some manner with one of the major sports in the inter-collegiate program.

101-102-103. Physical Education for Majors. 1 hour each.

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

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

112. First Aid and Safety Education. Lectures, discussion and practice in the giving of first aid in cases of emergency. The American Red Cross First Aid Certificate may be obtained by students who pass a satisfactory examination. 3 hours.

121. Health Education. The relation of hygiene to home and community life, including a study of sewage disposal, refuse disposal, 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, and other health problems arising in a school system; methods and materials for teaching health and evaluation. 3 hours.
133. Theory and Practice of Plays and Games. The need, purpose, and function of play in education; activities adaptable to various levels of the elementary and secondary schools. Two hours of theory and two hours of laboratory per week. 3 hours.

*213. Advanced First Aid. Instruction and advanced training in 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. The principles underlying modern practices in physical education and recreation from the standpoint of general education; the methods used in the natural program of physical education, such as the teaching of fundamental skills of tumbling and stunts, basketball, indoor baseball, speedball, volleyball, handball. Class, three hours; practice, two hours. 5 hours.

321. Methods in Coaching Football. Equipment, fundamentals of the game, kicking, passing, handling the ball, tackling, blocking; individual position play; discussion of various types of offensive and defensive formations now in use, and the merits of each; strategy and generalship. 3 hours.

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

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

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

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

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

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

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

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

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

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

Physics

(Department 124)

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

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

*Indicates electives.
for its cultural or its vocational value. Emphasis is placed on clear concepts, accurate thinking, and the complementary nature of the experiment and theory.

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 to the best advantage.

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

**BASIC CURRICULUM FOR CONCENTRATION IN PHYSICS**

**FRESHMAN YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Mathematics 151, 152, 153, or 241, 242, 243</td>
<td>15</td>
</tr>
<tr>
<td>Gen. Chem. 131, 132, 133</td>
<td>12</td>
</tr>
<tr>
<td>English 151, 152, 153</td>
<td>9</td>
</tr>
<tr>
<td>Soc. Sci. Courses 111, 112, 113</td>
<td>9</td>
</tr>
<tr>
<td>Physical Education 101, 102, 103</td>
<td>(3)</td>
</tr>
<tr>
<td>Lib. Arts Orientation</td>
<td>(1)</td>
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<td><strong>45</strong></td>
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**SOPHOMORE YEAR**

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<thead>
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<tr>
<td>Mathematics 251, 252, 253, or 341, 342</td>
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</tr>
<tr>
<td>Physics 241, 242, 243</td>
<td>15</td>
</tr>
<tr>
<td>Ph. &amp; Religion 231, 232, 233</td>
<td>9</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>12</td>
</tr>
<tr>
<td>Physical Education 201, 202, 203</td>
<td>(3)</td>
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<td><strong>Total</strong></td>
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**JUNIOR YEAR**

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
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<tbody>
<tr>
<td>Math 351</td>
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<tr>
<td>Physics 302, 303, 423</td>
<td>13</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>12</td>
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<tr>
<td>Speech, Art, Music</td>
<td>9</td>
</tr>
<tr>
<td>Engl. or Amer. Liter. or Social Science</td>
<td>9</td>
</tr>
<tr>
<td>Th. &amp; Adv. Lab. in Phys. 310, 320, 330</td>
<td>5</td>
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<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>
SENIOR YEAR

-Physics 401, 402, 413, or 403 13 5 5 3
-Th. & Adv. Lab. in Phys. 310, 320, 330 7 3 2 2
Engl. or Amer. Liter. or
Social Science Course 9 3 3 3
Electives 19 5 6 8

Total 48 16 16 16

210. Physics. A lecture and demonstration course of fundamental physical laws in mechanics, heat, electricity, sound, and light for elementary education majors. Prerequisites: 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, pharmacy and secondary education students. Three class periods and two hours of laboratory. 211 should precede 212 and 213. Prerequisite: 1 year of College mathematics.

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

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

233. Physics: Electricity and Magnetism. 5 hours.

A series of courses designed for engineers and physical science majors. Four class periods and two hours of laboratory. 231 should precede 232 and 233. Prerequisite: Mathematics 251 or 241 to be taken concurrently.

250. Astronomy. Study of celestial bodies including distance, motion, size, distribution of planets, stars, extragalactic nebulae, and modern theories regarding their origin and evolution. Prerequisite: Physics 210 or equivalent. 3 hours.

302. Electronics. Electron ballistics, thermionic emission, vacuum tube and transistor characteristics, rectifiers, amplifiers, oscillators, modulators, demodulators, and electron tube and transistor instruments. Four class periods and two hours of laboratory. Prerequisite: Calculus 253 and Physics 233. 5 hours.
303. **Modern Physics.** A lecture and problem course reviewing and applying vectors and differential equations to classical mechanics and electrodynamics. The concepts involved in quantum mechanics, relativity and statistical mechanics are introduced. Applications of the above fields are presented to atomic physics, macrophysics and astrophysics. Prerequisites: Math 351 or 341 and Physics 233. 3 hours.

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

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

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

340. **Theory and Advanced Lab: Nuclear Physics and Solid State.** Credit is given in courses 310, 320, 330 and 340 according to the amount of work done. A quiz is given on assigned readings for each experiment. Offered every quarter. Prerequisite: Physics one year. 1-6 hours.

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

402. **Electricity and Magnetism.** Electric and magnetic fields, dielectrics, inductance, capacitance, direct and alternating current circuits. Prerequisites: Physics 233 and Mathematics 351 and 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 (Chairman), Assistant Professors Crider, Cohoe.

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.

Requirements for a major in the area of social welfare can be obtained from the department chairman.

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

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

**Psychology**

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

223. **Child Development.** Characteristics of the child at different levels of maturity; physical, mental and emotional growth; growth and organization of meanings; control of social and ethical behavior; development of personality. Prerequisite: Psychology 111. *3 hours.*

311. **Psychology of Personality.** The nature and development of personality, and methods of adjustment; discussion of the various theoretical approaches to the psychology of personality. Prerequisite: Psychology 111. *5 hours.*
313. **Educational Psychology.** A study of the learning process and the conditions that promote learning. Prerequisite: Psychology 111. 3 hours.

332. **Applied Psychology.** The application of psychological principles to problems of modern life; clinical practice; personnel work; home life; education; industry; business law and criminology; medicine and social reform. Prerequisite: Psychology 111. 5 hours.

351. **Social Psychology.** Social behavior and social adjustment; the effect of the social environment upon the development of personality; the relation of social and psychological laws to problems of the community. Prerequisite: Psychology 111. 5 hours.

353. **Psychology of Business and Industry.** The principles and applications of psychology as used in business, industry and personnel work. Prerequisite: Psychology 111. 3 hours.

411. **Counseling and Guidance.** The basic psychological principles involved in educational, vocational, and personnel counseling; the application of these principles to a sound guidance program. Prerequisite: Psychology 111. 5 hours.

421. **Abnormal Psychology.** Behavior pathology; the neuroses and psychoses; various theoretical approaches to the problems of etiology. Prerequisite: Psychology 111. 5 hours.

423. **Psychology of the Exceptional Child.** The classification of the non-typical child; the use of the school and other sources for meeting his needs. Special attention to the slow learner and retarded child. Prerequisite: Psychology 111. 3 hours.

424. **Psychology of the Gifted Child.** An analysis of the psychological problems of the gifted child. Prerequisite: Psychology 111. 3 hours.

433. **Human Growth and Development.** A systematic study of human development from conception to old age. Special emphasis is given to the physical, emotional and personality development of the individual. Prerequisite: Psychology 111. 3 hours.

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

141. 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.

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


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

300. Population Problems. The composition of population according to sex, age, color; its distribution in the territory of the U.S.; fertility, mortality. The problems of mate selection, birth control, standard of living and migrations are discussed. 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. (1966-67). 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; some study of penal institutions and of the history of punishment. 5 hours.

323. Juvenile Delinquency. The factors associated with 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. (1966-67). 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 function and programs of state and local governments, private and voluntary agencies, in meeting the problems of the aged, unemployed, disabled, handicapped, children and other special groups. 3 hours.

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

403. **Race Relations.** A study of the phenomena which arise when groups of people who differ racially or culturally come into contact with one another. 5 hours.


413. **Industrial Sociology.** The social organization of industry and human relations in the work plant. Problems of conflict and cooperation in the work group and the relation between the work group and the community are emphasized. 3 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.** The development of premarital and marital counseling together with the details of its practice; emphasis upon role playing in a counseling situation. This course is open only to students with the approval of the instructor. Prerequisite: Sociology 201-202. 5 hours.

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

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

441-442. **Social Welfare Investigation.** Social welfare investigation and methods of research and their application to the analysis of social phenomena. 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. 2-5 hours.
College of Engineering

Lawrence H. Archer, Dean

Academic Recognition

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

Purpose

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

History

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

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

Admission

As early as the junior year of high school the student interested in engineering is encouraged to obtain the advice of the Dean of the College of Engineering and to request appropriate information and application materials from the
Office of Admissions, Ohio Northern University. Each applicant for admission should read carefully the section of this catalog entitled ADMISSION TO THE UNIVERSITY (see Table of Contents). 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. The sciences must include physics, and should include chemistry.

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

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

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

LOAD

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

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

A student on probation who falls below 2.0 either for the quarter or in his accumulative average is subject to suspension or dismissal. Suspension implies the possibility of readmission a year later.

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

CLASSIFICATION

The minimum requirements for sophomore standing are 53 quarter hours of academic work; for junior standing, 107 hours, with all freshman and sophomore requirements completed; for senior standing, 165 credit hours and the satisfactory completion of the English Proficiency Examination.

GRADUATION AND DEGREES

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

All degree candidates must spend their senior year in residence, taking at least forty-five quarter hours in senior 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 freshman and senior 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.

ENGINEERING BUILDING

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

COMPUTER CENTER

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

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

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

PROFESSIONAL AND TECHNICAL ORGANIZATIONS

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

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

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

The Institute of Electrical and Electronics Engineers Student Branch is the technical society of electrical engineers. Topics pertinent to the field of 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 Electronic Engineers.

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

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

**PRE-ENGINEERING CURRICULA**

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

**ARTS-ENGINEERING CURRICULA**

A new program in the combined two degrees was designed and started in 1964. The student is admitted to both the College of Liberal Arts and the College of Engineering at the start of the planned program. In five academic years two degrees, Bachelor of Arts in the College of Liberal Arts and Bachelor of Science in the appropriate branch of engineering in the College of Engineering can be earned. An advantage of the program is the fact that a student can major in any subject matter area in liberal arts as well as any branch in engineering.

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

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>English Composition I, II, III</td>
<td>112151 - 112152 - 112153</td>
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<tr>
<td>General Chemistry I, II, III</td>
<td>122131 - 122132 - 122133</td>
<td>3 3 4</td>
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<tr>
<td>Calculus &amp; Analytical Geometry I, II, III</td>
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<td>Language II</td>
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<td>Social Science</td>
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### Second Year

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<td>Engineering Math I, II, III</td>
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<tr>
<td>Engineering Physics I, II, III</td>
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<td>Fine Arts and/or Speech</td>
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<td>Liberal Arts Major</td>
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<tr>
<td>Digital Computer I, II, III</td>
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<td><strong>18 3 20</strong></td>
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R = Recitation  L = Laboratory  C = Credit  

Catalog numbers followed by - (dash) indicate dependent courses.  
Catalog numbers followed by , (comma) indicate no dependence.  
Student will work out 6 terms of Physical Education during the first six terms of school.  
Orientation will be scheduled by each Freshman each term.
THIRD YEAR

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<tr>
<td>Liberal Arts Major</td>
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<tr>
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<tr>
<td>Engineering Mechanics I, II, III</td>
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<tr>
<td>Passive &amp; Active Circuits I, II, III</td>
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| Total                                           | 16 4 18 | 15 7 18 | 18 3 19 |
| Surveying Camp for Civil Engineers              | 202300 (Post-Spring) | (12 Successive Days) | 5 hours |

FOURTH YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Junior Engineering Courses</td>
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<td>plus Liberal Arts Major</td>
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FIFTH YEAR

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# BASIC ENGINEERING PROGRAM

## FIRST YEAR

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<tr>
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## SECOND YEAR

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<tr>
<td>General Chemistry I, II, III</td>
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<td>Engineering Mathematics I, II, III</td>
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<td></td>
<td>15 7 18</td>
<td>14 10 18</td>
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## SURVEYING CAMP FOR CIVILS

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

R = Recitation, L = Laboratory, C = Credit Hours
Catalog numbers followed by - (dash) indicate dependent courses.
Catalog numbers followed by , (comma) indicate no dependence.
Student will work out six terms of Physical Education during the first six terms of school
Orientation will be scheduled by each freshman each term.
BASIC COURSES

During the first two years all engineering students follow the same general program. Except for advisory purposes, it is not necessary for the student to select a branch of engineering until the end of the third quarter of the sophomore year.

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

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

BASIC ENGINEERING

(Code Number 201)

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

100. HIGH SCHOOL REFRESHER FOR BEGINNING ENGINEERING STUDENTS (Pre-Fall). For a period of three weeks, five days per week, eight hours per day, a review of those portions of high school mathematics that are necessary to start college mathematics is offered previous to the opening of the fall quarter. All beginning freshmen 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. One hour per quarter equivalent, 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. To help the student to make the transition from high school to college as well as the proper orientation in the profession.

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

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

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

201. Engineering Graphics I (0+4). Lettering, use of instruments, applied geometry, orthographic projection, sketching, pictorial sketching, dimensioning. 2 hours.

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

211. Engineering Mechanics I (3+0). Fundamental principles of mechanics with vector methods as applied to statics. Includes resultants of force systems, centroids and centers of gravity, equilibrium, friction, moments of inertia, and virtual work. Prerequisite: Math 243 or Math 253, Physics 233. 3 hours.

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

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

221. Passive & Active Circuits I (3+0). Introductory concepts followed by the presentation of a-c circuits as a problem in differential equation theory. Phasor representation, series and parallel circuits, resonance phenomena and network theorems are studied. Prerequisite: Physics 232. 3 hours.

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

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

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

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

243. Thermodynamics I (3+0). Energy and work of conservative systems; temperature and other properties by methods of statistical inference; laws of thermostatics and thermodynamics for macroscopic systems by reasoning from premises of microscopic behavior. Prerequisite: Physics 233, Math 243 or Math 253, Chemistry 131. 3 hours.

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

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

Civil Engineering Department

Professor Miles (Chairman), Associate Professor Hillery, Assistant Professors Koehler, Wu, Mr. Chopra

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 drafting 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.
<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fourth</td>
<td>Water &amp; Sewage Treatment, Water Supply &amp; Sewerage Practice, Construction Methods, Concrete Technology, Civil Engineering, Steel Structures, Plastic Design, Advanced Structural Mechanics, Elective Humanities</td>
</tr>
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</table>
Testing of Materials Laboratory equipment enables the student to perform a wide variety of standard ASTM tests and includes screw gear universal testing machines, hydraulic testing units, pendulum type torsion machine, universal impact tester, high speed rotary fatigue testing machine, hardness testers, extensometers, compressometers, and SR-4 strain gages.

The Concrete Laboratory provides for the conducting of many of the tests, standardized by ASTM and AASHO, for concrete materials, cement and mortars, and includes high and low temperature humidity chamber, sieve shaker with standard sieves, concrete beam and cylinder testing machines, and flow table, together with the usual small pieces of equipment.

The Soil Mechanics Laboratory has a portable unconfined compression machine, drying oven, water bath, soil dispersion apparatus, C.B.R. apparatus, sampling equipment, permeameter, compaction outfit, direct single shear apparatus, double shear equipment, triaxial apparatus with pore pressure attachment, and Proctor and Howard miniature moisture density apparatus, being equipped to perform wet and dry sieve analysis, Atterbury limits, hydrometer analysis and compaction, relative density, permeability, consolidation, triaxial, direct shear, and C.B.R. tests.

In the Fluid Mechanics Laboratory, water under constant head is supplied from a standpipe to weirs, venturi meters, orifices, displacement meters, friction board, flume, and other equipment. Pumps of various designs are available for use on the pump test stand.

Transits, levels, plane tables, alidades, theodolites and smaller equipment are available for varied field exercises.

Engineering education instills within the student the ability to know how, to know why, and to do the best engineering job possible for his client for the least amount of money in keeping with the Code of Ethics of the Professional Engineer.

CIVIL ENGINEERING

(DEPARTMENT 202)

300. Surveying I (3+6) (Surveying Camp). Use of various tapes, level, and transit; differential and profile leveling; traversing; earthwork calculations; presence and magnitude of errors; the application of surveying methods of land, city, and topographic surveys. Prerequisite: Math 152, 202. 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. *Statically Indeterminate Structures* (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. *Frame Analysis* (3+3). Application of action and displacement methods using the method of consistent distortion to evaluate indeterminate structures. Prerequisite: 312. 4 hours.
323. **Hydraulics (3+0).** Flow in pipes and complex pipe systems; introduction to non-uniform flow in open channels and rivers; elementary hydraulic model theory; pumping machinery. Prerequisite: 201322. 3 hours.

331. **Surveying II (3+4).** Theory and practice in horizontal and vertical curves as applied to the location and design of highways, railroads, and other routes of transportation, with special emphasis on highway geometrics and interchanges. Procedures and problems encountered in high-order control surveys for bridges, dams, tunnels, and other large construction projects. Prerequisite: 300. 5 hours.

332. **Photogrammetry (2+3).** The use of aerial photography in different phases of engineering such as transportation, surveying, etc.; air photo interpretation; study of devices used in photogrammetry; analytic solution of tilt and rectification problems; and controlled mosaics. Prerequisite: 331. 3 hours.

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

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

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

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

353. **Engineering Geology (3+0).** Study of minerals and rocks; physical, historical and structural geology; geological forms; land formations; planning of soil surveys. Techniques of air photo interpretation in identifying the engineering properties of soil: surface and subsurface geological maps. Field trip. Prerequisites: 300, Chemistry 133, or by special permission. 3 hours.
411. Water and Sewage Treatment (3+0). Principles and methods of water purification, sewage treatment, and disposal; control tests and correlation of results with treatment plant operations; interpretation of reports; inspection of local plants. Prerequisite: Chemistry 133, 323. 3 hours.

412. Water Supply and Sewerage Practice (3+0). Development of sources of water supply; determination of quantity of storm water; design of water distribution systems; design of storm water sewers; design of sanitary sewers; hydraulic design of water and sewage treatment plants. Prerequisite: 411. 3 hours.

413. Construction Methods (2+3). Specifications, economical construction methods, quantity take-offs, cost analysis, and cost estimating as applied to various engineering projects. Prerequisite: 421, 441. 3 hours.

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

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

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

431. Soil Mechanics (3+3). An introduction to soil engineering, physical properties of soils as affecting engineering design and construction, soil sampling, mechanics of soil masses, stability, settlement, types of foundations, and laboratory soil tests. Prerequisites: 323, 353. 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: At least junior standing. 3 hours.
441. **Theory of Structural Design** (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. **Plastic and Elastic Design** (2+3). Theory of plastic design; analysis of ultimate load, design of connections, determination of deflections using plastic design, and comparison to elastic design. Prerequisite: 441. 3 hours.

443. **Advanced Structural Mechanics** (3+0). Theory of elasticity, structural stability, plates and shells, and vibrations. Prerequisite: 442. 3 hours.

490. **Civil Engineering Project; or, Special Problems; or Advanced Transportation Engineering; or, Advanced Sanitary Engineering; or, Astronomy and Geodesy; or, Hydrology and Hydraulic Engineering** (2+3). Practical projects involving calculation, design, drafting, and engineering judgment. Prerequisite: Senior standing; or, special problems, Prerequisite: Last Quarter of Senior Year; or, topics in highway, railroad, water, and air transportation, Prerequisite: 333, 432; or, the application of engineering principles toward the control of the environment for the protection and improvement of the health and comfort of man, including the design of water and sewage treatment plants and the reduction of air pollution, Prerequisite: 411, 412; or, fundamentals of spherical trigonometry, celestial coordinate systems, variations of star coordinates, different positions of stars, time systems, determination of astronomical positions, adjustment of a traverse, properties of ellipsoid, geodetic sections, spherical excess, direct and inverse problems, Clark's formula for long lines, datums, and electronic distance measuring instruments, Prerequisite: 332; or, elementary treatment of major topics in hydrology, including rainfall, evaporation, groundwater and runoff. Treatment of advanced problems in river mechanics including flood routing, channel improvement, and spillway and reservoir design, Prerequisite: 323. 3 hours.

**ELECTRICAL ENGINEERING DEPARTMENT**

Professors Klingenberg (Chairman), Alden; Assistant Professors Carmean, Tseng, Cheng, 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.
### ELECTRICAL ENGINEERING

(See Page 136 For First & Second Year)

#### THIRD YEAR

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<th>Course</th>
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<th>Spring</th>
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<td>Field Waves I, II, III</td>
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| Total | 16  | 6    | 18     |

#### FOURTH YEAR

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| Total | 15  | 6    | 17     |

| Total | 15  | 6    | 17     |
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 laboratory work in which problem solving is emphasized. The Instrument Room is equipped with fine indicating instruments. The Power Laboratory contains a number of transformers of convenient size, AC-DC motor generator sets, generalized machines, and other power and automatic control equipment. The Communications Laboratory is equipped with a wide variety of test equipment, including bridge-type instruments, wave analysis, portable cathode ray oscilloscopes, and analog computers.

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, telegraph systems, electronics, development of electrical equipment and controls for the aerospace science, construction and operation of generating stations and electric power systems, installation and operation of equipment in industrial plants, design of power apparatus, and manufacture and sale of electrical equipment.

**ELECTRICAL ENGINEERING**

(Department 203)

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

311. **Electronics I** (3+0). Small-signal amplifiers; feedback; audio-frequency and radio-frequency amplifiers with large signals. Prerequisite: 201-223. 3 hours.

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

323. **Network Analysis** (3+0). Matrix circuit and topological circuit analysis; signal-flow graphs and circuit analysis; one-port reactive networks; two-port reactive networks. Prerequisite: 342. 3 hours.
331. **Fields and Waves I (4-0)**. Electrical phenomena from the viewpoint of field theory. Vector analysis used throughout. Prerequisite: 223, Math 353. 4 hours.

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

333. **Fields and Waves III (4-0)**. Electric energy propagation; infinite line; lossless lines; Smith Chart; impedance transformation and matching; loss line analysis; wave guides; group and phase velocity; impedance of wave guides. Prerequisite: 332. 4 hours.

342. **Transient Analysis (4-0)**. Application of Laplace Transform methods to transient phenomena in linear electrical and mechanical systems. Prerequisite: 223, Math 353. 4 hours.

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

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

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

353. **Electrical Engineering Laboratory III (0-3)**. Laboratory study of servomechanism equipment; use of analog computer. Prerequisite: 343 or concurrently. 1 hour.

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

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

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

422. **Nonlinear Analysis (3-0)**. Analysis of physical systems containing non-linear elements. Analytical, graphical, and numerical methods are studied. Prerequisite: 441. 3 hours.
423. Communication Theory (3-0). An introduction to the principles of communication theory. Prerequisite: 312, 342. 3 hours.

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

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

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

441. Control Systems II (3-0). Control loop design using root locus method and real frequency response methods. Prerequisite: 343. 3 hours.

451. Electrical Engineering Laboratory IV (0-3). Transmission line; attenuation, magnitude and phase of voltage, and current on lines; reflected waves. Electronic wave shaping and switching circuits. Prerequisite: 333, 411 concurrently. 1 hour.

452. Electrical Engineering Laboratory VI (0-3). Continuation of 451. Filters and power electronics application. Prerequisite: 451, 412 concurrently. 1 hour.

453. Electrical Engineering Laboratory VIII (0-3). Nonlinear electrical networks and communication circuits. Prerequisite: 452, 442, 423 concurrently. 1 hour.

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

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

463. Electrical Engineering Laboratory IX (0-3). A laboratory study of non-electromechanical energy conversion devices. Prerequisite 433 concurrently. 1 hour.
MECHANICAL ENGINEERING DEPARTMENT

Professor Horl dt, 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)

# MECHANICAL ENGINEERING

(See Page 136 For First & Second Year)

## THIRD YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Fall</th>
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## FOURTH YEAR

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<td>Mechanical Engineering Laboratory IV, V, VI</td>
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<td>Heat Trans. II, Adv. Engr. Mechanics I, II</td>
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<td>204441, 204442 - 204443</td>
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312. **Materials II (2+0)**. Manufacturing processes: an introductory course to cover the basic machining operations (turning, drilling, boring, milling, planing, shaping, grinding, forging, shearing, and pressing), their machines, tools, and equipment; their programming for numerical and tape control of automation type mass-production equipment; gauging and inspection. Prerequisite: 311. 2 hours.

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

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

*Founders Hall*
Dean Meets with Freshmen

331. Mechanical Engineering Laboratory I \((0+6)\). 2 hours.
332. Mechanical Engineering Laboratory II \((0+6)\). 2 hours.
333. Mechanical Engineering Laboratory III \((0+6)\). 2 hours.
Fundamental mechanical laboratory sequence: specific experiments involving measurements, instrumentation, calibration, and analysis of experimental accuracies. Concurrent small-team investigative projects of timely interest. Prerequisite: Junior standing.

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

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

343. Heat Transfer I \((3+0)\). Heat, mass, and momentum transfer in stationary systems (including steady one, two, and three dimensional conduction as well as unsteady one dimensional conduction), and laminar flow systems. 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 re-
moving 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 I (3+3). 4 hours.

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

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

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

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

423. Thermal System Analysis III (2+0). 2 hours.
Integration of the fundamental (and repetitive) thermal aspects of the traditional fields of internal combustion engines, steam power stations, environmental control and turbomachines with emphasis on the system analysis approach and stimulation techniques. Prerequisite: 203343, 323, 343.

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

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

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

441. Heat Transfer II (3+0). Heat, mass, and momentum transfer in turbulent flow systems. Heat transfer with boiling and condensation, in high velocity flow and rarefied gases and radiant heat transfer. Prerequisite: 343. 3 hours.
442. Advanced Engineering Mechanics I (3+0). Methods of structural mechanics with applications to curved flexural members, thick-walled cylinders, contact stresses, stress concentration, and other selected topics in stress analysis. Prerequisite: 202301. 3 hours.

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

490. Mechanical Engineering Projects. Practical studies of investigations involving the application of original thought, the determination of new information and/or new application of known information or equipment. Prerequisite: Senior standing. 1-5 hours.
Close Student-Teacher Relationships
College of Pharmacy

Dr. Robert P. Fischelis, 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. It is included in the list of accredited colleges of pharmacy issued by the American Council on Pharmaceutical Education, July 1, 1964.

FACULTY OF THE COLLEGE OF PHARMACY

OFFICERS:

Robert P. Fischelis, Dean
Henry D. Roth, Secretary

FACULTY:

*Robert P. Fischelis, Pharm. D., Sc.D., Dean and Professor of Contemporary Pharmacy; Advisor to the President on Education in the Health Professions

Nancy Dapore, LL.B.*, Instructor in Business Law

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

*John E. Hall, B.Sc., Instructor in Biological Sciences

William Hewitt, Ph.D., Professor of Pharmacology and Toxicology; Acting Chairman, Department of Biological Sciences

William D. Humphrey**, M.A., Associate Professor of Business Administration

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

Morton Mallin, Ph.D., Associate Professor of Microbiology

*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 public 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 PHARMACY

Students entering the pre-professional pharmacy program should have at least three years and preferably four years of English; two years of mathematics

*Registered Pharmacist
(algebra and plane geometry), but priority will be given to students with additional credit; two to three years of science (biology, general science, and chemistry or physics or both). Priority will be given to students with four years of science subjects.

Freshmen, upon entering the pre-professional pharmacy program, prior to their registration, will be given entrance examinations in English, Mathematics, Social Studies, and Natural Sciences as part of the American College Testing Program (A.C.T.). In addition, all students are given an examination in Algebra II.

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 102 quarter hours, or 68 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 catalogue 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.
Pharmacy Laboratory

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 fourth year of the Professional Program.

3. Scholarship Rating and Probation. Good academic standing requires a 2.0 (C) average. A student falling below this is placed on warning at the first occurrence. If he falls below a 2.0 average the following or any subsequent quarter he will be placed on probation. A student on probation who fails to meet the terms of his probation is subject to suspension or dismissal.

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

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

Each candidate for a degree:

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

QUALIFICATIONS FOR EXAMINATION AND REGISTRATION AS A PHARMACIST

Every Applicant shall:

1. Be a citizen of the United States, or shall have made application therefor;
2. Be not less than twenty-one years of age;
3. Be of good moral character and habits;
4. Be a graduate from a school or college of pharmacy or a department of pharmacy of a university recognized and approved by the State Board of Pharmacy and have completed at least the minimum course in pharmacy as outlined by the American Council on Pharmaceutical Education.
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 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.

*250 quarter hours will be required for the graduating class of 1969.
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. All 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. Special library facilities will become available in the Pharmacy Continuation Study Center and the new College of Pharmacy, now under construction.

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

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

The professional curriculum in the College of Pharmacy is administered under three headings; namely, the Department of Pharmacy, the Department of Pharmaceutical Chemistry and the Department of Biological Sciences.

The Department of Pharmacy includes courses in pharmacy orientation, pharmacy calculations, health orientation, introduction to pharmacy, pharmaceutical preparations, history of pharmacy, vocational pharmacy, ethics and social obligations, prescription practice, and pharmacy administration. There are also a number of elective courses in this department which are described in subsequent pages.

The Department of Pharmaceutical Chemistry includes courses in chemistry of inorganic medicinal products, biochemistry, chemistry of natural and synthetic organic medicinal products, pharmaceutical analysis and instrumentation. There are also a number of elective courses in this department which are described in subsequent pages.

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

THE FIVE YEAR PHARMACY PROGRAM

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

<table>
<thead>
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<th>Pre-Professional Program*</th>
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| SECOND YEAR (PLA-2)       |

| Pharmacy 201             | Chemistry 232            | Chemistry 233           |
| 1                         | 4                        | 4                       |
| Chemistry 231            | Physics 222***           | Physics 223***          |
| 4                         | 4                        | 4                       |
| Physics 221***           | Philosophy and Religion 232 | Philosophy and Religion 232 | 3                         | 3            |
| 4                         | 3                        | 3                       |
| Philosophy and Religion 231 | Biology 112 or 201       | Biology 113 or 203      |
| 3                         | 4                        | 4                       |
| Biology 111              | Pharmacy 202             | Pharmacy 200            |
| 4                         | 1                        | 3                       |
| Physical Education       | Physical Education       | Physical Education      |
| 0                         | 0                        | 0                      |
|                           |                          |                          |
| Total Hours               | 16                       | 16                      |

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

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

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

#### THIRD YEAR (P-3)

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<td>Pharmacy 301</td>
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**Total Hours**: 17  
**Winter**: 16  
**Spring**: 17

#### FOURTH YEAR (P-4)

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<td>Pharmacy 410</td>
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<td>Pharmacy 411</td>
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<td>Pharmacy 412</td>
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<td>Pharm. Chem. 431</td>
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**Electives**: 6  
**Total Hours**: 17  
**Winter**: 16  
**Spring**: 18

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<td>Pharmacy 502</td>
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<td>Pharmacy 553*</td>
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<tr>
<td>Pharmacy 551</td>
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<td>Pharmacy 552*</td>
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</table>

**Electives**: 3  
**Total Hours**: 18  
**Winter**: 16  
**Spring**: 16

*Substitution permitted for students preparing for Graduate School

**NOTE**: All students who contemplate going into Retail Pharmacy should attempt to take Pharmacy 551, 552, and 553 in the 4th year so business electives can be taken in the 5th year.
APPROVED ELECTIVES (those counting toward graduation)

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<thead>
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<th>College of Pharmacy</th>
<th>Liberal Arts</th>
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<tr>
<td>Pharmacy 500</td>
<td>Biology 301-303, 401-403</td>
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<td>Pharmacy 510</td>
<td>Chemistry 341-343, 352-353, 363</td>
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<td>Pharmacy 520</td>
<td>Economics 322, 323, 333, 351, 363, 371-373</td>
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<td>Pharmacy 530</td>
<td>English 201-203, 211-213, 301-303</td>
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<tr>
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<td>Pharmacy 570</td>
<td>History 111-113, 211-213, and others</td>
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<tr>
<td>Pharm. Chem. 530</td>
<td>Music 200 and 351-353</td>
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<td>Pharm. Chem. 540</td>
<td>Philosophy and Religion 351-353, and 331-333</td>
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<tr>
<td>Pharm. Chem. 550</td>
<td>Political Science 201-203</td>
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<tr>
<td>Biological Science 461</td>
<td>Psychology 211-213, 311, 332</td>
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<td>Biological Science 462</td>
<td>Sociology 201-203, 331, 341-342-343</td>
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<tr>
<td>Biological Science 550</td>
<td>Education (for those wishing to obtain a teacher’s certificate)</td>
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</tbody>
</table>

DESCRIPTION OF COURSES

PRE-PROFESSIONAL PROGRAM

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

COURSE REQUIREMENTS

PROFESSIONAL PROGRAM

DEPARTMENT OF PHARMACY

(Department 301)

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

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

200. PHARMACY CALCULATIONS (3+0). Weights, measures, density, percentage, discounts, and related subjects as they pertain to pharmacy. 3 hours.
201, 202. Health Orientation (1+0). To orient the pharmacy student in the greater field of health and medical care to which the profession of pharmacy contributes an indispensable function; a survey of existing Federal, State and Local health agencies, voluntary health organizations, professional and trade associations within the scope of and related to pharmacy; the manner in which preventive, curative and mitigating services are made available at various economic levels; discussions of the background and extent of pharmaceutical services as a part of various public and private systems of providing medical care and insurance against the costs of sickness. It is expected that the student will not only acquire an understanding of the many resources which contribute to the improvement of the public health and the conquest of disease but also an insight into the areas of health services which he might wish to pursue in his future career. 1 hour each.

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

302. Pharmaceutical Preparations (3+3). The manufacture of official solutions, suspensions, and other liquid preparations; the chemistry and/or the physics involved in making these products, and the correct procedures to be used in manufacturing, packaging and labeling. Prerequisites: Pharmacy 200 and 301. 4 hours. Formerly Pharmacy 301.

303. Pharmaceutical Preparations (3+3). A continuation of course 302; the manufacture of solid and semi-solid preparations, such as ointments, pastes, tablets, capsules and related products. Prerequisite: Pharmacy 302. 4 hours. Formerly Pharmacy 302.

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

411. Vocational Pharmacy (Hospital) (1+0). The administrative and professional principles and concepts of the practice of pharmacy in hospitals; organization of the staff of the hospital pharmacy and its relation to the hospital organization as a whole; the hospital pharmacist’s relation to the medical, nursing and intern staffs and his function as a member of the therapeutic committee; his relation to the central supply agency of the hospital. 1 hour.
412. Vocational Pharmacy (Industrial) (1+0). The vocational opportunities in the field of production of drugs; how a large scale organization in the drug industry functions; administrative functions related to management, quality control, advertising, selling, detailing, production of scientific and trade-promoting literature. Relation of the professional and scientific to the business aspects of manufacturing enterprises by special lectures, demonstrations and conferences. When possible, representative establishments will be visited and films depicting industrial procedures will be shown. 1 hour.

413. Vocational Pharmacy (Production and Distribution) (1+0). The procedures for bringing the fruits of modern drug research from the initiating laboratories and clinics to the bedside of the patient; the facilities for wholesale and retail distribution and the part to be played by pharmacists in this activity. 1 hour.

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

501-502-503. Prescription Practice (3+3). The prescription: the receiving, filling, handling involved in all compounding techniques and procedures, beginning with solid then semi-solid and finally liquid dosage forms, to include a discussion of chemical, physical, and therapeutic incompatibilities; a biopharmaceutical evaluation of these dosage forms as well as sustained action, radio pharmaceuticals, and other new dosage applications; study of commercial specialities (classification, manufacturer, generic names, dosage forms, dose and indications or uses.) Prerequisites: Fifth year standing and Pharmacy 303, Ph. Ch. 462, Biological Science 403. 4 hours each.

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

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

530. Manufacturing Pharmacy (1+6). The formulation and fabrication by mechanized methods of a variety of pharmaceutical dosage forms. Prerequisites: Open to 5th year students, Ph. 303, Ph. Ch. 462. (el) 3 hours.
550. **Pharmacy Problems.** For students interested in undergraduate research. (el) 1-3 hours.

551. **Pharmacy Administration (law)** (3+0). Federal, state and local acts and regulations governing the practice of Pharmacy and the sale of potent and habit forming drugs. Government bulletins and pamphlets are supplied. 3 hours.

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

553. **Pharmacy Administration (marketing)** (3+0). The marketing of drugs and drug products from the manufacturer's and wholesaler's standpoint; laws governing commercial manufacture, distribution, and the various fair practices acts, as they pertain to pharmacy. 3 hours.

560. **Contemporary Pharmacy** (2+0). Current problems of pharmacy: factual analyses, panel discussions, development of suggested solutions based on practical experience and proposed methods of procedure. The current literature of pharmacy will be reviewed from the standpoint of accuracy, adequacy and reliability for professional guidance. 2 hours.

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

**DEPARTMENT OF PHARMACEUTICAL CHEMISTRY**

(Department 302)

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

332. **Pharmaceutical Analysis.** (3+3). Procedures and theories of gravimetric and volumetric analysis, their application and use in pharmaceutical analysis. Prerequisites: Chemistry 133 and Pharm. Chem. 331. 4 hours. Formerly 331.
333. **Pharmaceutical Analysis (3 + 3)**. A continuation of volumetric procedures and theories. Quantitative procedures for chemical analysis and microscopic examination of plant products, crude drugs and drug preparations. Prerequisites: Chemistry 233 and Pharmaceutical Chemistry 332. 4 hours. Formerly 332.

431. **Biochemistry (3 + 3*)**. The chemistry and metabolism which occurs in animals and humans; the chemical processes of the body, their action and interaction; chemically derived products useful in pharmacy. This course is spent on the chemistry of carbohydrates, fats, proteins, nucleic acids and enzymes and the metabolism of carbohydrates. Prerequisite: Chemistry 233. 4* hours.

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

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

462. **Chemistry of Organic Medicinal Products (4 + 0)**. A continuation of Pharmaceutical Chemistry 461. Prerequisite: Pharmaceutical Chemistry 461. 4 hours. Formerly 532.

530. **Chromatographic Analysis. (1 + 3)**. Types of chromatographic analysis and electrophoresis. Prerequisites: Physics 223, Pharmaceutical Chemistry 432, 462. (el) 2 hours.

531. **Pharmaceutical Analysis and Instrumentation (2 + 6)**. A continuation of plant chemistry and analysis; instrumental procedures and processes used in drug and chemical analysis. Prerequisites: Fifth year standing, Physics 221, 222, 223 and Pharmaceutical Chemistry 432 and 462. 4 hours.

540. **Qualitative Organic Tests (1 + 3)**. Lectures and laboratory combined to demonstrate the tests for identification of organic drugs and chemicals official in the U.S.P. and N.F. Prerequisites: Chemistry 233 and Pharmaceutical Chemistry 462. (el) 2 hours.

550. **Chemistry Problems.** The title and character of the course depends upon the problem; introductory research work. Open to fifth year students only. (Note special requirements for all problem courses.) (el) 1-3 hours.

*Three hours until the academic year 1966-67.
DEPARTMENT OF BIOLOGICAL SCIENCES

(DEPARTMENT 303)

All students are required to complete at least three quarters of physiology. A description of these courses is listed under Biology, elsewhere in this catalog. These courses are prerequisite to the professional courses in pharmacology.

103. INTRODUCTORY MICROBIOLOGY (3-2). Fundamentals of general and medical microbiology, with some consideration of anti-infection agents. Enrollment limited to students of nursing. Prerequisite: Elementary biology and chemistry. 4 hours.

301-302. INTRODUCTION TO MEDICAL MICROBIOLOGY I, II (3-3). Fundamentals of microbiology, especially as related to health professions; immunity, pathogenicity, microbial diseases of man and domestic animals, and methods for prevention and treatment of such diseases. Prerequisite: General biology, or botany-zoology (one year's study of either type). 4 hours each. Formerly 401-402.

303. BIOLOGICAL SOURCES OF DRUGS (4-3). The origin, biosynthesis, methods of preparation, chemical and physical traits, and principal uses of drugs and pharmaceutical necessities obtained from organisms. Prerequisites: One year of general biology or botany-zoology; organic chemistry. 5 hours.

421. INTRODUCTION TO PHARMACOLOGY (3-0). Abnormal physiology, organic pathology, principles and nomenclature of prevention, diagnosis, pathogenesis, prognosis, and therapy; general concepts of pharmacodynamics. Prerequisites: Anatomy, physiology, and general chemistry. 3 hours.

422-423. PHARMACODYNAMICS I-II (3-3). Drugs classed according to actions and uses in man. Laboratory work, usually coincidental with assigned reading and discussion of the same class of drugs, consists of observations of drug action in man and laboratory animals. Prerequisites: Biology 331-332-333 and Chemistry 231-232-233, or equivalents in physiology and organic chemistry; and Biol. Sci. 421. 4 hours each.

461. PARASITOLOGY. The principal protozoan, arthropodal, and helminth infestations of man and domestic animals are discussed. Prerequisite: Biol. Sci. 302. (el) 2 hours.

462. VIROLOGY. Viral and rickettsial infections menacing to the health of man and animals in relation to diagnostic treatment and control procedures. Prerequisite: Biol. Sci. 302. (el) 2 hours.
501. Toxicology (3+3). The pathophysiology, symptomatology, causes, prevention, and treatment of poisonings as they occur in agriculture, food preparation, industry, households, and medical practice, with some consideration of toxicity testing in the development of new nutritional and pharmaceutical products. Prerequisite: Biol. Sci. 423 or equivalent. 4 hours.

502. Principles and Practices of Public Health (3+0). Individual and community aspects of public hygiene; epidemiology and prophylaxis of accidents and violence; the major types of illness (nutritional, metabolic, mental, infectious, environmental, occupational); public and private health agencies and health law; the roles of the pharmacist in public-health activities of the community, and in individual hygiene instruction. Prerequisites: Introductory medical microbiology; toxicology; elementary statistics. 3 hours. Formerly Biol. Sci. 323.

550. Undergraduate Research in Biological Sciences (1+1-3). Training in the documentation, manipulative and intellectual skills of investigation in the biologic science areas of interest in pharmacy. Students elect to do semi-independent work in one of the sub-areas (biosynthesis of drugs, microbiology, parasitology, public health, physiologic chemistry, pharmacology, toxicology) and are assigned to a staff supervisor with the aim of producing publishable results. Oral and written reports are required. The course may be taken repeatedly and is offered in each term. Prerequisite: The introductory course in the area of special interest, and consent of the instructor concerned. (el) 1-3 hours.

SPECIAL NOTICE

As stated earlier, the pharmacy curriculum, because of rapid developments in the medical and allied professions, is constantly being reviewed by the faculty. The College of Pharmacy reserves the right to change the content, duration and sequence of any course included in the curriculum leading to the accepted degree, without advance notice. 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.
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. It offers a three-year program leading to the degree of Juris Doctor. Its graduates are eligible to take the bar examination in practically 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 catalogue should be directed to the Dean of the College of Law.

Student Lawyers Meet with Common Pleas Judge
Prior to Annual Moot Court Competition
University Administration

UNIVERSITY STAFF MEMBERS
1964-65

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President of the University,
Retires summer of 1965

SAMUEL LEWIS MEYER, A.B., M.S., Ph.D., LL.D.,
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EUGENE K. EAKIN, A.B., S.T.B., M.Ed., Ph.D., LL.D.,
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ROBERT P. FISCHELIS, Ph.G., Ph.C., Pharm.D., B.S., Ph.M., Sc.D.,
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EUGENE N. HANSON, A.B., A.M., LL.B., LL.M.,
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   Dean Emeritus, College of Pharmacy

Claude Westcoat Pettit, A.B., LL.B., LL.M., LL.D.,
   Dean Emeritus, College of Law

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Floyd M. Elliott, M.D., Physician

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Robert W. Biggs, B.S.C.E., President, The S. K. Wellman Co., Bedford, Ohio

James K. Fulks, B.S.E.E., 27224 Southfield, Lathrup Village, Michigan
Term expires 1968

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MERRILL J. INSLEY, B.S.Ph., Insley Drug Store, Bellefontaine, Ohio
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Term expires 1969


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Term expires 1966


Term expires 1967

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S. LEE WHITEMAN, A.B., M.A., S.T.B., D.D., Administrative Assistant to the Bishop, Ohio West Area, The Methodist Church, 395 E. Broad St., Columbus, Ohio.

Term expires 1969

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Department of Physics, Professor of Physics

CARROLL R. ALDEN, B.S.E.E., B.S.M.E. (Ohio Northern), M.E. (Detroit Institute of Technology), P.E. (Ohio), Fellow A.S.M.E. 1955, Professor of Electrical Engineering

JOHN M. ANDERSON, B.S., M.A. (Peabody), 1962, Instructor in Band

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

ALBERT A. BAIIILIS, A.B., LL.B. (Western Reserve), LL.M. (New York),
1957, Professor of Law
JOSEPH BANKS, B.S.Ed. (Ohio Northern), M.E. (Kent State), 1960, Assistant Professor of Physical Education

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

RUTH BARLOW, A.B. (Heidelberg), M.A. (McMaster, Hamilton, Ontario), 1964, Instructor in English

BETTY JANE BARTLETT, B.A. (Muskingum), M.A. (Michigan), 1960, Director of Theatre, Associate Professor of Speech and Drama

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

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

A. A. BENEDICT, A.B. (Ohio Wesleyan), A.M. (Ohio State), 1952, Professor of Physics

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

GORDON M. BENNETT, B.A. (New York State), M.A. (Teachers College, Columbia), 1959, Assistant Professor of Mathematics

DONALD J. BETTINGER, B.S. (Miami, Ohio), M.S. (Cincinnati), Ph.D. (North Carolina), 1963, Chairman, Department of Chemistry, Professor of Chemistry

WILFRED E. BINKLEY, B.S. (Ohio Northern), A.B. (Antioch), A.M., Ph.D. (Ohio State), Pub. Adm. D. (Bowling Green), LL.D. (Ohio Northern), 1920, Professor of History and Political Science

ROBERT BOWDEN, A.B. (Haverford), B.S. (Ohio Northern), A.M. (Michigan), 1952, Chairman, Department of Biology, Associate Professor of Biology

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

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

JUDITH A. BRANDT, B.A. (Ohio University), LL.B. (Ohio Northern), 1964, Librarian, College of Law
BRUCE E. BURTON, B.S.M.E. (Ohio U.), M.A.E. (Chrysler Inst. of Engr.), M.S. (Ohio State), (Colorado), P.E. (Ohio), 1958, Leave of absence 1965-66, Head, Department of Mechanical Engineering, Associate Professor of Mechanical Engineering

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

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

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

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


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

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

ALFRED E. COHOE, B.A. (Albion), M.A. (Bowling Green), 1962, Assistant Professor of Sociology and Psychology

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

HAROLD COTSAMIRE, B.B.A. (Ohio State), 1957, Bursar with rank of Instructor

WILLIAM ROBERT CRIDER, B.S. in Soc. Adm. (Ohio State), M.Ed. (Bowling Green), 1961, Assistant Professor of Psychology

OSCAR G. DARLINGTON, A.B., A.M. (Penn State), Ph.D. (Pennsylvania), 1955, Dean, College of Liberal Arts, Professor of History

ELMA GRANT DAVIS, B.A. (Northwestern), M.A. (Arkansas), 1956, Assistant Professor of English
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

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

RHEA EARL, B.S.Ed. (Ohio Northern), M.Ed. (Pittsburgh), 1960, Assistant Professor of Education

JOSEPH ELIAS, (U. of Kaunas), (U. of Munchen, Germany), (U. of Rome), M.A. (Loyola), 1963, Assistant Professor of Foreign Language

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

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

MARIA S. ESPINO, (Normal Teacher College), Ed.D. (Central U., Cuba), 1964, Assistant Professor of Spanish

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

JOHN P. FINAN, B.A. (Fordham), LL.B. (Columbia), 1963, Assistant Professor of Law

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, College of Pharmacy, Professor of Contemporary Pharmacy and Adviser to the President on Education for the Health Professions

OTIS GAMES, A.B., A.M. (Ohio Wesleyan), D.Ped. (Ohio Northern), 1952 Counselor of Freshman Men with the rank of Assistant Professor

FLORENCE GERDES, B.A. (Michigan), M.A. (Columbia), 1958, Assistant Professor of English

LOUIS S. GIBB, B.S., M.A. (Nebraska), 1964, Vice President for Development and Public Relations
JOANNA N. GIDWANI, B.A. (Oberlin), M.A. (Wellesley), Ph.D. (Ohio State), 1964, Assistant Professor of Biology

ALBERT BORDEN GMINDER, B.A. (Catawba), M.A., Ph.D. (North Carolina), 1959, Associate Professor of Romance Languages

MAURINE S. GMINDER, B.S. (Richmond Prof. Inst.), M.A. (North Carolina), 1963, Instructor in Music

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

JANICE M. GREEN, B.S. (Geneva), M.S. (Pittsburgh), 1963, Instructor in Mathematics

JOHN GRIGSBY, B.Mus., M.A. (Ohio State), 1959, Assistant Professor of Music (Leave of Absence)


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

WILLIAM A. HAGGSTROM, B.S. (Minnesota), M.Ed. (Minnesota), 1963, Director of University Union with rank of Instructor

EUGENE N. HANSON, A.B. (Luther), A.M., LL.B. (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

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

BYRON L. HAWBECKER, B.A. (Manchester), M.S. (Arizona), 1963, Instructor in Chemistry

WILLIAM F. HEWITT, JR., A.B. (Princeton), M.Sc., Ph.D. (Chicago), 1962, Professor of Pharmacology and Toxicology

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. in Ed. (Ohio Northern), M.A. (Bowling Green), Assistant Professor of Biology

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

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

ROBERT R. HUDDLESTON, A.B. (Baker), B.D. (Garrett), Th.D. (Iliff), 1959, Assistant Professor (Leave of Absence)

WILLIAM D. HUMPHREY, B.S. (Lafayette), M.A. (Oberlin), 1957, Director of Evening Division, Associate Professor of Business Administration

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Anthony J. Celebrezze,
LLB '36
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