THE GEORGE FRANKLIN AND
SARAH CATHERINE GETTY

COLLEGE OF LIBERAL ARTS

BERNARD L. LINGER, Dean.

DIVISIONS AND DEPARTMENTS

FINE ARTS: Art; Music; Speech and Theatre.
HUMANITIES: English; Foreign Languages; Philosophy and Religion.
MATHEMATICS AND NATURAL SCIENCES: Biology; Chemistry; Mathematics; Physics.
SOCIAL SCIENCES: Business Administration and Economics; History and Political Science; Psychology, Sociology and Social Work.
TEACHER EDUCATION: Education; Health and Physical Education; Industrial Arts.

OBJECTIVES

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

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

In addition to the general requirements for admission to the University stated in this catalog, the College of Liberal Arts accepts graduates of high school and non-graduates with sixteen acceptable units of work who are recommended by the high school principal. Twelve of these units shall be as follows: four units in English; two units in Mathematics (including algebra and plane geometry); six units in History, Social Studies, Languages or Natural Sciences, or any combination thereof.

Students are encouraged to take foreign language while in high school. Acceptable scores on the College Entrance Examination Board tests or the American College Test are expected of all incoming students. If the former, the English Composition (EN) Achievement Test of the CEEB is required, also, and the Mathematics Level I Achievement Test is suggested for students interested in science areas.

High school seniors whose ability and maturity warrant may, upon recommendation of the high school principal and with the approval of the Admissions Committee, take a limited amount of college work for credit on campus during their senior year, or during the summer preceding their senior year.
THE DEGREE OF BACHELOR OF ARTS

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

*Prescribed:* The courses listed below constitute the GENERAL EDUCATION COURSES required of all students. They are listed by academic divisions; optional alternate subject disciplines within the division are indicated.

**FINE ARTS**
Art 100 or Music 100
Speech 100 or Theatre 105

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

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

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

**TEACHER EDUCATION**
Education 100

In order to add depth to the GENERAL EDUCATION COURSES, it is further required that the student complete two additional courses (six credit hours) in each academic division. These two courses must be in the same subject discipline in which the student has completed the GENERAL EDUCATION COURSES; however, the choice of the discipline belongs to the student. Additional course requirements in the Teacher Education Division are excepted for students taking departmental majors. In the division in which the student has selected his major the two additional courses required are fulfilled as a normal part of his major curriculum.

English 100, 101, 102 may be taken in any order. The student must schedule one of the three courses in English every quarter until he has received credit in all three.
The Major: The candidate for a degree must complete in a logical sequence a major of not less than forty-five quarter hours. The faculty adviser will assist the student in planning his major not later than the last quarter of the second year. Candidates for the degree of Bachelor of Arts who expect to teach in the public school must satisfy professional education requirements and will have a member of the Department of Education for a professional adviser.

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

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

TEACHER CERTIFICATION

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

Students preparing to teach must make formal application to the Teacher Education Program by the end of the sophomore year. The student must maintain a 2.0 total accumulative average, a 2.25 quality point average in his major field, and have completed 75% of prescribed freshman and sophomore course work. The Teacher Education Committee, representing all Divisions of the College of Liberal Arts, considers applications for admission to the program.

All students preparing to teach are assigned advisers in the Department of Education to assist with scheduling of Professional Education courses.
The adviser in the student's major department continues to advise the student with regard to meeting the requirements for the major.

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

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

LIBERAL ARTS HONORS PROGRAM

The purpose of the Liberal Arts Honors Program is to broaden the educational experiences and responsibilities of both students and faculty.

The Program is designed to aid a select group of students in more fully realizing their academic potential. To this end, regular curricular requirements are relaxed, a special academic program is planned for the individual student's particular abilities and educational goals, and regulations or requirements deemed necessary to the orderly curricular progress of the general student body are waived wherever such appears to be in his best interests.

A student of outstanding academic potential who is not sufficiently challenged by the regular curriculum or who finds himself hampered by the traditional grading system should consider applying for this program. Whether he has the requisite potential along with the motivation essential to success in the program is determined by the Honors Program Council, who base their judgment on the information submitted with his application, on the recommendations of his teachers, and on one or more interviews with the student himself.

MEDICAL SCIENCES CURRICULA

*Medical Sciences Programs. A Medical Sciences Committee consisting of representatives of the basic areas of preparation for medical sciences, namely, Biology, Chemistry, Math-Physics, and a representative from outside the Division of Mathematics and Natural Science has been established in the College of Liberal Arts. The general objectives of the committee are:
1. To provide students preparing for a career in the Medical Sciences the best possible professional counseling relative to their overall education.
2. To serve as a source of information concerning pre-professional education in the Medical Sciences.
3. To serve as a source of recommendations to professional schools in the medical sciences.

The committee meets with all students at summer orientation and regularly thereafter during the student’s undergraduate career. The committee provides a guideline and a time table to help the student as he pursues his career goal. Ordinarily, the first year program includes Biology, Chemistry, English and Mathematics. After the first year, except for Organic Chemistry and Physics, the program will be a function of the student’s choice of departmental major and the professional schools to which he (she) wishes to apply. A broadly based liberal education in addition to the basic science courses is highly recommended. For further information contact Dr. Howard L. Haight, Chairman, Medical Sciences Advisory Committee.

Arts-Medical Technology. A student may be permitted to apply forty-five (45) quarter hours earned at any accredited professional school of medical technology toward a Bachelor of Arts degree. Of those 45 quarter hours, 15 quarter hours may be applied toward a Biology major. (Contact the Department of Biology for additional information).

PRE-THEOLOGY

The recommendations of the American Association of Theological Schools are followed in counseling 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.

The Chairman of the Department of Philosophy and Religion serves as adviser to the pre-theological student in planning his pre-professional program, along with a departmental adviser in his major, if the student elects a major outside the Department of Philosophy and Religion.

PRE-LAW

Because of the increasing interest of students in law as a career, a Prelaw Advising Committee has been established. This Committee represents all departments in the College of Liberal Arts. The committee provides prelaw
students with information regarding preparation for law school and helps improve departmental advising of students who indicate an interest in becoming attorneys.

In keeping with law school recommendations, it is suggested that prelaw students pursue a broad course of study in liberal arts in any major and that they carefully select electives from the social sciences, fine arts, humanities, and natural sciences.

The College of Liberal Arts is assisted by the presence of the College of Law at Ohio Northern in the advisement of prelaw students. The law school faculty serve as valuable sources of information concerning prelaw study and the law school also gives undergraduate students first-hand opportunity to visit classes and to discuss legal education with law students. The Law School Admission Test, which is required for admission to all accredited law schools, is given several times each year on campus.

Prelaw students in the College of Liberal Arts meet throughout the academic year as a group for social activities which include hearing speakers representing law schools. Members of the Prelaw Advising Committee also meet with new students at summer orientation. For more information concerning the prelaw program contact Dr. David Saffell, chairman of the committee.

COMBINATION CURRICULA

FOUR AND FIVE YEAR COMBINATION CURRICULA

The Arts-Engineering, Arts-Pharmacy programs are five year curricula for the student challenged by the rewards of in-depth study in both the Liberal Arts and the professional fields of Engineering or Pharmacy. The student pursues degrees simultaneously in the College of Liberal Arts and Engineering or Pharmacy, pays tuition at the Engineering or Pharmacy College rate, has an adviser in each college, and receives an appropriate degree in each college upon graduation.

Students taking the dual degree in the College of Liberal Arts and Engineering must be prepared to take advanced mathematics in his first year. The curriculum outline is given in the Engineering section of this catalog.

Students taking a dual degree in the College of Liberal Arts and College of Pharmacy must meet the three-year residency requirement to qualify for graduation from the College of Pharmacy. Students must meet all require-
ments in each college in the same fashion as students taking only a single degree.

Students pursuing a four-year dual major program in two departments within the College of Liberal Arts are required to meet each department's requirements for the major in that discipline. Students pay tuition at the College of Liberal Arts rate.

THE INTERDISCIPLINARY MAJOR PROGRAM

The interdisciplinary major allows the student to pursue three areas of study leading to a B.A. degree. The student may develop several intellectual, artistic, or career interests and so broaden himself and his opportunities for a career following college.

The interdisciplinary major requires 33-38 quarter hours in each of three areas of study. All the academic departments in the Getty College of Liberal Arts participate in the program. Teacher certification may be earned in most of the areas. The basic degree requirements for a B.A. degree remain the same for those graduating with an interdisciplinary major.

A student may apply for the interdisciplinary major after he has successfully completed the first two quarters of his freshman year. Applications to the Interdisciplinary Committee are available from the Dean of the College of Liberal Arts.

GENERAL REGULATIONS

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

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

3. The student indicates his choice of a major field by filling out a Declaration of Major card available in the offices of the department chairmen. The completed card indicates that the department accepts a student as a major. To change from one department to another, the student shall complete a Change of Major card, also obtainable as indicated above. A student is officially accepted as a major in a department only when he has completed the above procedure. The faculty adviser will assist the student in planning his major not later than the last quarter of the second year.
4. No course for which the student has received a "D" is acceptable toward a major field or area of concentration.

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

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

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

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

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

CLASSIFICATION OF STUDENTS

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

PROBATION

A grade point average of 2.0 is necessary for graduation. If the accumulative grade point average of a student falls below 2.0 within a given quarter, the student will be placed on probation and his participation in extracurricular activities shall be reviewed by his adviser, the Personnel Dean and the Dean of his College.

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

SENIOR COMPREHENSIVE EXAMINATION

The requirement of a Senior Comprehensive Examination is a matter of departmental policy. The decision and authority either to require or not require the examination rests with the department, as does the determina-
tion of all policies regarding such examinations, where they are required. Students should consult the departmental sections of the catalog and the department chairman in order to determine the existing policy for Senior Comprehensive Examinations within the respective departments.

GRADUATION

To graduate with the Bachelor of Arts degree, the student must complete a minimum total of 182 quarter hours which shall include the prescribed 16 GENERAL EDUCATION COURSES, plus 130 quarter hours of academic work (including 3 quarter hours in physical education), with an accumulative qualitative point average of at least 2.0. A residence period of the last three quarters and the completion of at least forty-five quarter hours, with at least ninety quality points, elected largely from “300” and “400” courses in the College of Liberal Arts of this University are considered to be minimum residence requirements for all students.
THE DEPARTMENTAL COURSES

ART
(Department 151)

ASSOCIATE PROFESSORS DEVORÉ, GORDON (Chairman), WEST;
INSTRUCTORS CHESSER, STRASBURGER.

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

The artist should be educated comprehensively through a program combining professional training and broad study in the Liberal Arts. It is on this premise that the student majoring in art; (1) receives as broad an understanding of art as possible; (2) becomes acquainted with historical and cultural knowledge of the past and present; (3) develops a working proficiency through mastery of the tools and skills of his profession; (4) develops personal modes of expression in the media of the visual arts; and (5) acquires an awareness of and competency in other academic disciplines.

A student majoring in Art must complete 76 hours including 151, 152, 161, 162, 210 (6 hrs.), 255, 350, 265, 289, 6 hours selected from 270, 280, 370, 380, 9 hours selected from 250, 251, 355, 420, and 12 hours selected from 100, 325, 335, 344, 345, 346, 347.

Professional Education requirements are listed by the Department of Education.

A comprehensive examination in art and a public exhibition of the student's studio work are prerequisites for graduation with a major in art.

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Required of all majors in the department. 1 hour.

100. ART. Analysis of the visual arts through selected works from the past and present. Illustrated lecture. 3 hours.

114-115. ART FOR ELEMENTARY TEACHERS. For prospective classroom teachers with emphasis on theory, media, and techniques. Open only to Elementary Education majors. 114, 3 hours. 115, 3 hours.

151. DRAWING I. Introduction to methods and media of drawing. Required of all art majors. 3 hours.

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

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

162. DESIGN II. Organization of elements and principles in three dimensions. 3 hours.
210. **FIGURE DRAWING.** Drawing and anatomical study of the human figure. May repeat for credit to total of 12 hours. 3 hours.

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

222. **LETTERING.** Basic letter forms, emphasis on proportion, theory, rendering technique, and applications of lettering in commercial art. May repeat for credit once. Prerequisites: Art 151 and 162. 3 hours.

250. **PAINTING I.** An introduction to techniques and modes of painting. Emphasis on theory and use of color. 3 hours.

251. **PAINTING II.** Techniques and modes of painting in oil. Prerequisite Painting I. May repeat for credit to a total of 6 hours. 3 hours.

255. **CERAMICS I.** Methods and Techniques of forming clay products with emphasis on hand construction. Introduction to work on the potters wheel. Decorating, glazing and firing of ceramic ware. 3 hours.

265. **SCULPTURE I.** An introduction to the design and rendering of sculptural form in a variety of media and techniques. Emphasis on organizational problems of form and space. 3 hours.

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

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

335. **CONTEMPORARY TRENDS.** Emphasis on appearances, and development of basic artistic movements from beginning of 20th century to the present. 3 hours.

344. **ANCIENT ART.** Art forms and styles from prehistoric times through the fall of Rome. 3 hours. Not available to students who have received credit for 305.

345. **MEDIEVAL ART.** Developments in European Art from the fall of Rome through the 14th century. 3 hours. Not available to students who have received credit for 305.

346. **THE RENAISSANCE.** The development of European art and architecture during the 15th and 16th centuries. 3 hours. Not available to students who have received credit for 315.

347. **BAROQUE.** The historical development of the visual arts in the Western World from 1600 to 1784. 3 hours. Not available to students who have received credit for 315.

350. **CERAMICS II.** Methods and techniques of forming, decorating, glazing, and firing clay bodies; slab, wheel-thrown, and cast. Prerequisite 255. May repeat for total of 9 hours. 3 hours.

355. **WATERCOLOR.** Techniques and modes of painting in aqueous media. 3 hours.

360. **SCULPTURE II.** The design and rendering of sculptural forms in a variety of media and techniques. Prerequisite 265. May repeat to total of 9 hours. 3 hours.
370. LITHOGRAPHY. Methods and techniques. Prerequisites: Art 152, 162, and 3 hours of 210. May repeat to total of 6 hours. 3 hours.

380. INTAGLIO PRINTMAKING. Methods and techniques of etching and engraving. Prerequisites: Art 152, 162, and 210. May repeat to total of 6 hours. 3 hours.

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

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

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

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

457. ART EDUCATION METHODS. Laboratory-seminar dealing with materials, techniques, and methods of secondary classroom instruction in art. Meets professional education requirement in methods area. 3 hours.

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

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

494. SEMINAR IN ART. 1-3 hours.

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

BIOLOGY
(DEPARTMENT 121)

PROFESSORS BOWDEN (Chairman), BUTLER, MEYER: ASSOCIATE PROFESSORS DAWSON, HOCH, LAING, NELSON, TIPPLE; ASSISTANT PROFESSORS GIDWANI, KEISER, MOORE, INSTRUCTORS DUDROW, PORTERFIELD; ASSISTANT INSTRUCTOR SMITH; LECTURER CALVERT.

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

Additional requirements for majors are:
Biology 112, 113, 195, 201 or 202, 223, 301, 331, 343, 430, 431, 495 and fifteen (15) credit hours
elected from: 201, 202, 213, 234, 290, 297, 302, 303, 332, 333, 350, 423, 490, 495, 497, microbiology 361, 362 (offered in the College of Pharmacy).

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

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

100. BIOLOGY. Biological principles and concepts of plant and animal life, stressing their application to man. 4 hours.

Alternate 100. BIOLOGY. Independent Study Program. The student's rate and method of study are given maximum independence under department supervision. Consult the chairman. 4 hours.

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

Alternate 112, 113. GENERAL BIOLOGY. Independent Study Program. The student's rate and method of study are given maximum independence under department supervision. Consult the chairman. Prerequisite: Biology 100. 8 hours.

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

201. DEVELOPMENT IN SEED PLANTS (2 + 4). A quantitative and developmental approach to the life history of the seed plant emphasizing the interactions of structures and processes. Prerequisite: General Biology 112. 4 hours.

202. MAINTENANCE OF THE VASCULAR PLANT (2 + 4). The complementarity of structure and process in maintenance of the vascular land plant: mechanics, environmental exchange, formation and internal translocation of water, solutes and gases. Prerequisite: General Biology 112. 4 hours.

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

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

231-232-233. ANATOMY AND PHYSIOLOGY (3 + 3). Basic principles of human body structure and function, including the physiology of exercise. Prerequisite: General Biology 113. 12 hours.

234. THE ENVIRONMENT OF MAN. (2) The interactions of man and his surroundings with emphasis on the problems arising from increasing human population. 2 hours.

290. SPECIAL TOPICS IN BIOLOGY.
297. INTRODUCTION TO BIOLOGICAL INVESTIGATIONS. Minor investigations for qualified freshmen and sophomores. 1 hour.

301-302-303. DEVELOPMENTAL ANATOMY (2 + 4). Biological principles involved in embryonic development, the structural changes and the resulting functional modifications of the vertebrates. Prerequisites: General Biology 113. 12 hours.

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

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

343. TECHNIQUES AND INSTRUMENTATION (1 + 3). Principles and procedures used in biological investigations. Open to juniors majoring in biology. 1 hour.

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

423. ECOLOGY (3). The distribution, abundance and productivity of organisms interactions among themselves and with their environment. Prerequisite: Proficiency in elementary mathematics including statistics. 3 hours.

424. ECOLOGY LABORATORY AND FIELD WORK (3). Individual investigation of a field or laboratory problem in the distribution and abundance of an organism, and a field study of regional ecosystem patterns in the Great Smokey Mountains and the Lake Michigan Dunes. Field trips required. Corequisite: Biology 423. 1 hour.

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

431. GENETICS LABORATORY. (3). Experiments which demonstrate genetic phenomena. Drosophila, bacteria, microscope slide and probability studies are employed. Corequisite: Biology 430. 1 hour.

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

495. SEMINAR IN BIOLOGY. 1-3 hours.

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

(Department 131)

PROFESSOR CONKLIN (Chairman); ASSOCIATE PROFESSOR YOUNG; ASSISTANT PROFESSORS KNIFFEN, WEBSTER; INSTRUCTORS BISSEY, GOLDBERG, WILLIAMSON; LECTURER DAPORE.

The GEORGE WILLARD PATTON CHAIR OF ECONOMICS, endowed by the Richard King Mellon Charitable Trusts of Pittsburgh, Pennsylvania, has been established effective with the academic year 1973-74.

This department seeks to develop a basic understanding of the theories and principles of Economics and Business Administration as they apply to our modern economic system and the organization and management of modern business enterprise.

The student entering this department has a choice of two major fields, Economics and Business Administration. In the field of Business Administration there are four areas of concentration: Accounting, Finance, Marketing and Management. Students whose major is Business Administration must complete 330, 351 and 362, and students whose major is Economics must complete 383 and 384.

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

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Required of departmental majors. 1 hour.

100. ECONOMICS. The origins, characteristics, and functions of our economic organization. Current institutional arrangements, the use of appropriate tools of economic analysis; relevant economic and social goals. 3 hours.

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

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

203. PRINCIPLES OF MACROECONOMICS. Forces that determine the behavior of national income and output, unemployment, and the price level. Rudiments of money and banking, monetary, and fiscal policy, growth and development. Selected issues of contemporary social relevance. Prerequisite: Economics 100. 3 hours.
301-302-303. INTERMEDIATE ACCOUNTING. Income measurement and recognition, the matching process, financial statement and actuarial mathematics as applied to accounting problems, pensions and leases, tax allocation, price-level effects, funds flow, accounting changes. Prerequisite: Accounting 133. 9 hours.

311-312. COST ACCOUNTING. Job order, process, and standard cost systems. Controls for material, labor, and overhead. Methods of cost allocation. Joint and by-product costs. Flexible budgets and the development of cost parameters. Prerequisite: Accounting 133. 6 hours.

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

330. PRINCIPLES OF MANAGEMENT. The organization of firms. Modern management methods, decision making processes, procedures, physical equipment and standards. Organization and managerial relationships of major industrial functions. Prerequisites: Economics 202-203. 3 hours.

341. LABOR ECONOMICS. Labor as a factor in production; labor mobility; theories of the determination of wages, and bargaining theory; history and methods of labor unions, and government relations to labor. Prerequisites: Economics 202-203. 3 hours.

344. STATISTICAL TECHNIQUES IN ECONOMICS AND BUSINESS. Develops analytical tools in probability and probability distributions, estimation and hypothesis testing, Bayesian analysis, game theory, and sampling techniques; with appropriate example. Prerequisites: Math 142-143. 3 hours.

351. MARKETING. Management-oriented; concepts, processes, and problems of marketing; channels of distribution, marketing research, brands and price policies. Prerequisites: Economics 202-203. 3 hours.

352. MONEY AND BANKING. Theories of money and credit; commercial banking practices; reserve banking; monetary and banking laws; money market; money and credit in the world economy. Prerequisites: Economics 202-203. 3 hours.

354. FINANCIAL INSTITUTIONS. Managerial policies and decision-making concepts of commercial banks, savings and loan associations, mutual savings banks, and other financial institutions. Prerequisite: 352. 3 hours.

362. CORPORATION FINANCE. Handling and flow of corporate funds; problems of fixed and working capital, income level, dividend policy and the use of borrowing; case analysis used. Prerequisites: Economics 202-203. 3 hours.

363. PERSONNEL MANAGEMENT. The functions of the personnel department in industry. Case analysis of problems in selection, training and incentives; the human factor in industry. Prerequisites: Economics 202-203. 3 hours.
370. MANAGERIAL ACCOUNTING. Use and interpretation of accounting data in controlling and planning business activities and decision making. Business problems examined from the point of view of internal management. Prerequisite: Cost Accounting 312. 3 hours.

371. SALESMANSHIP. The principles, techniques and problems of salesmanship; sales management, recruiting, controlling and evaluating the sales force; market research, channels of distribution and pricing. Prerequisites: 202-203. 3 hours.

372. ADVERTISING. Advertising as a phase of the marketing process; selling appeals and types of advertising; consideration of copy and media; problems of publishing and broadcast advertising. Prerequisites: Economics 202-203. 3 hours.

373. TRANSPORTATION. Waterway, railway, highway, pipeline and air transportation and their development in the U.S.; rates and their effect on location and development of industry; government regulation; and labor relations. Prerequisites: Economics 202-203. 3 hours.

375. MERCHANDISING. Retail store location and layout, merchandise assortment, promotion and price policies, research in management theory, cost and expense analysis. Prerequisites: Economics 202-203. 3 hours.

381. INCOME TAX. The Federal Income Tax structure as related to individuals and corporations, problems involving the law and regulations; tax areas applicable to different forms of business organization. 3 hours.

383. INTERMEDIATE MICROECONOMIC THEORY. Special problems of pricing, production, and distribution under perfect competition, oligopoly, duopoly, and monopoly in the American economy. Prerequisites: Economics 202-203. 3 hours.

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

385. INTERNATIONAL ECONOMICS. Theories and current problems of trade between nations; governmental restrictions and controls; the importance of multilateral trade; balance of payments; scarce resources; population, and employment trends. Prerequisites: Economics 202-203. 3 hours.

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

403-404. AUDITING. Auditing accounting records and statements, techniques of verifying financial statement items, preparation of working papers, and the writing of audit reports for complete audit. Prerequisite: Intermediate Accounting 302. 6 hours.
411. COMPARATIVE ECONOMIC SYSTEMS. A comparative study of capitalism, socialism, and communism with emphasis on the economics of pricing, production, and distribution under these systems. A specific and empirical examination of these systems in actual use, as in the United States, Russia, Great Britain and China. Prerequisites: Economics 202-203. 3 hours.

423. PUBLIC FINANCE. How the Federal government and local units of government finance themselves; taxation in its many forms, the securities issued by government units and the national debt of the United States. Prerequisites: Economics 202-203. 3 hours.

432. ACCOUNTING INFORMATION SYSTEMS. Theory and procedure for designing, installing, and maintaining accounting information systems for collecting, recording, analyzing, and presenting financial data. Prerequisites: Intermediate Accounting 301-302. 3 hours.

433. DATA PROCESSING. To prepare managers to understand electronic data processing equipment and its uses. Prerequisite: Management 330. 3 hours.

434. MARKETING RESEARCH. Research design, data collection methods, sampling techniques, tabulation and analysis of information concerning problems in marketing. Prerequisites: Economics 202-203. 3 hours.

442. ECONOMIC HISTORY OF THE UNITED STATES. Economic life in colonial America and the East-West migration; the development of modern business and industry in the United States; the corporation and its part in the nation's growth; the causes and consequences of the great depression. 3 hours.

443. HISTORY OF ECONOMIC THOUGHT. The development of economic thought from Greek and Hebrew writers to modern economists: Adam Smith, Malthus, Ricardo, Marx, Marshall, Keynes and modern economists. 3 hours.

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

462. INSURANCE. Chief applications of insurance: life, health and disability, fire casualty and marine; corporate bonding, pensions and group insurance, actual insurance problems presented by experienced operatives. Prerequisites: 202-203. 3 hours.

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

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

492. SPECIAL TOPICS IN ACCOUNTING. 1-3 hours.

494. SEMINAR IN ECONOMICS. 1-3 hours.

495. SEMINAR IN MANAGEMENT. 1-3 hours.

496. SEMINAR IN ACCOUNTING. 1-3 hours.

497. INDEPENDENT STUDY IN ECONOMICS. 1-3 hours.
498. INDEPENDENT STUDY IN MANAGEMENT. 1-3 hours.

499. INDEPENDENT STUDY IN ACCOUNTING. 1-3 hours.

CHEMISTRY
(Department 122)

PROFESSORS BETTINGER (Chairman), WILHELM; ASSOCIATE PROFESSORS GODWIN, HAIGHT, HAWBECKER; ASSISTANT PROFESSOR PUTNAM; INSTRUCTOR CROUSE; ASSISTANT INSTRUCTOR NAYLOR, LECTURER GLOD.

The Department of Chemistry is on the list of departments approved by the American Chemical Society for the professional education of chemists.

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

MAJOR IN CHEMISTRY

I. A program recommended for those who wish to become chemists or intend to pursue graduate study includes the following courses: 182, 183, 241, 242, 243, 304, 324, 341, 342, 343, 351 and 494. For the student who wishes to be certified as a professional chemist by the American Chemical Society, the following courses must be added: 451, 462, 497 and two of the following units: I, Chemistry 473; II, Chemistry 474; III, Chemistry 476; IV, Chemistry 481-482-483; V, an advanced mathematics or physics course approved by the department.

II. A modified major is available for those who wish to prepare for related areas such as medicine, sales or management in the technical industries, patent law, scientific communication and information retrieval, secondary school teaching, environmental science, and so forth. This program provides an opportunity to elect more work in areas that support the student's chemistry related career goal. The student is encouraged to assist in designing his program within the following framework: Chemistry 182, 183, 241, 242, 243, 304, 324, 351, 494 and a minimum of 12 credit hours from 300-400 level courses in the Division of Math and Natural Science or other 300-400 level courses acceptable to the Department. In addition, two of the three following cognate units are required: I, Physics 211-212-213 or 231-232-233; II, Three mathematics courses beyond Mathematics 100; III, Biology 100, 112, 113.

A comprehensive examination must be taken during the senior year by all chemistry majors.

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Required of departmental majors. 1 hour.

100. CHEMISTRY. Orientation to and understanding of the fundamental nature of Chemistry; models and measurements. 3 hours.

101. ENVIRONMENTAL CHEMISTRY. A topical study of chemicals in our environment, their origin, beneficial uses, harmful effects, and potential disposal methods. (3 + 0). Prerequisite: Chemistry 100. 3 hours.
102. CHEMICAL SYNTHESES. A topical study of the chemistry of the synthetic materials in common use, including plastics, cleaning agents, agricultural chemicals and medicinal chemicals. (3 + 0). Prerequisite: Chemistry 100. 3 hours.

171-172-173. INTRODUCTORY CHEMISTRY. Fundamental principles and use of modern theory and periodic relationships to explain observable facts. The laboratory illustrates basic principles, techniques of quantitative analysis, and includes the study of ions in aqueous solution. (171 & 172, 3 + 3, 173, 3 + 6) 4 + 4 + 5 hours.

181-182-183. INTRODUCTORY CHEMISTRY FOR MAJORS. The same lecture and laboratory as Chemistry 171, 172, 173. (181 & 182, 3 + 3; 183, 3 + 6) 4 + 4 + 5 hours.

231-232-233. ORGANIC CHEMISTRY. Organic compounds, applying the modern approach to bonding, structure, methods of synthesis and mechanisms of reactions. The laboratory program emphasizes procedures, syntheses and modern methods of separation and identification of organic compound. (3 + 3), Prerequisite. Chemistry 173. 4 + 4 + 4 hours.

241-242. ORGANIC CHEMISTRY FOR MAJORS. The same lecture and laboratory as Chemistry 231-232. (3 + 3). Prerequisite: Chemistry 183. 4 + 4 hours.

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

304. ORGANIC SYNTHESIS. Modern methods of organic synthesis; multi-step processes and the more difficult synthetic procedures. (2 + 6). Prerequisite: Chemistry 233 or 243. 4 hours.

324. INTERMEDIATE INORGANIC CHEMISTRY. Preparations, properties and reactions of elements and their compounds in terms of modern concepts. The laboratory involves the application of fundamental techniques to the synthesis of compounds and the systematic study of their properties and reactions. (2 + 3 or 2 + 6). Prerequisite: Chemistry 173 or 183. 3 or 4 hours.

341. PHYSICAL CHEMISTRY I. Fundamentals: primarily thermodynamics. Laboratory illustrates principles. (3 + 3). Prerequisite: Physics 231, 232, 233; Math 263; and Chemistry 173 or 183. 4 hours.


351. INTERMEDIATE QUANTITATIVE ANALYSIS. Fundamental theory of separations and analysis including application to volumetric, gravimetric and instrumental procedures. (2 + 6). Prerequisite: Chemistry 233 or 243. 4 hours.

451. ADVANCED INORGANIC CHEMISTRY. Chemical principles and bonding theory applied to the study of inorganic systems. (4 + 0). Prerequisite: Chemistry 324 and 343. 4 hours.
462. ADVANCED ANALYTICAL CHEMISTRY. The theory and practice of instrumental analysis. (3 + 3). Prerequisite: Chemistry 324 and 343. 4 hours.

473. ADVANCED TOPICS IN PHYSICAL CHEMISTRY. (3 + 0). Prerequisite: Chemistry 343, Math 264 and a reading knowledge of German (Taught in alternate years). 3 hours.

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

476. NUCLEAR CHEMISTRY. Fundamentals of radioactive transformation, nuclear reactions, chemical effects of ionizing radiation, chemical effects of nuclear transformations and use of radiotracers in chemical studies. (2 + 3). Prerequisite: Chemistry 304 and 324 and a reading knowledge of German. Corequisite: Chemistry 343. 3 hours.

481-482-483. SENIOR RESEARCH I, II, III. Prerequisite: Chemistry 304, 324, 343, a reading knowledge of German and approval of chairman required. 2 + 2 + 1 hours.

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

494. SEMINAR IN CHEMISTRY. Required of all senior chemistry majors. 1-3 hours.

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

EDUCATION
(Department 141)

PROFESSORS HANSON, MILLER, SPENCER, VAYHINGER (Chairman) ASSOCIATE PROFESSORS CRIDER, ELLERY, PARSONS, RUBECK; ASSISTANT PROFESSORS PERRY, TRAXLER; LECTURERS ALLEN, BACHMAN, GILSON, LLOYD, WRIGHTSMAN; ASSOCIATE PROFESSOR EMERITUS VAN ATTA.

The Teacher Education Program is designed to provide the prospective teacher with the general education, subject area concentration, and professional educational experiences that will enable him to enter the profession of teaching with competency.

A Provisional Certificate valid for four years is issued by the State of Ohio to students who earn the baccalaureate degree, including at least 32 credits for secondary certification or 48 credits for elementary certification, and are recommended by the College as having desirable personal qualities.

It is required that all prospective teachers have at least four experiences in working with youth groups prior to the student teaching experience. One recommended is the Participation Program, when students spend one week in their hometown school. Elementary Education majors are required to complete the departmental Senior Comprehensive Examination.

All students preparing to teach are required to:

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

B. Have for acceptance:
   1. An accumulative average of 2.25 in their major field, and 2.0 total average.
2. Favorable recommendations from advisors, major department, Dean of Women or Men, and Health Department.

3. Action by the Liberal Arts Committee on Teacher Education.

C. Meet the requirements in an area of concentration under the appropriate chairman.

1. ELEMENTARY EDUCATION

a. Provisional Elementary Certificate:
   Professional Education requirements:

   Education 100—Education 3 hours
   Education 223—Child Psychology 3 hours
   Education 250—Instructional Media 3 hours
   Education 260—Handwriting Methods 1 hour
   Education 261—Phonics for Elementary Teachers 1 hour
   Education 262—Seminar in Evaluation 1 hour
   Education 308—Teaching Mathematics 3 hours
   Education 309—Teaching Science 3 hours
   Education 310—Children's Literature 3 hours
   Education 311—Teaching Social Studies 3 hours
   Education 312—Teaching Language Arts 3 hours
   Education 314—Teaching Reading 3 hours
   Education 381—Elementary School Curriculum 3 hours
   Education 470-471—Student Teaching 15 hours
   Elective in Education 3 hours

   TOTAL Education 100 + 48 hours

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

2. SPECIAL CERTIFICATION—ELEMENTARY AND SECONDARY

For program of studies in the following areas, see the appropriate Department Chairman.

a. Art Education
b. Health Education
c. Music Education
d. Physical Education

3. SECONDARY EDUCATION

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

Students preparing to teach in secondary schools are required to complete a minimum of 75% of a major in a subject matter department in the College of Liberal Arts and have the endorsement of the department's chairman before qualifying for student teaching.
Professional Education requirements:
  Education 100—Education ........................................ 3 hours
  Education 224—Adolescent Psychology (Preq.: Psych. 100) .... 3 hours
  Education 370—School and Society ................................ 3 hours
  Education 380—Secondary Curriculum ........................... 3 hours
  or
  Education 375—Secondary Methods of Teaching .................. 6 hours
  Education 450—Special Methods of Teaching —— 452 English ... 3 hours
  —— 453 Social Studies ............................................. 3 hours
  —— 454 Mathematics ............................................... 3 hours
  —— 455 Science ..................................................... 3 hours
  —— 456 Language ................................................... 3 hours
  —— Art 457 ......................................................... 3 hours
  —— Music 361-362 .................................................. 3 hours
  —— Industrial Arts 423 .............................................. 3 hours

  Education 480-481—Student Teaching ............................. 15 hours
  Elective in Education ................................................ 2 hours
  TOTAL ........................................................................... 32 hours

Elective from the following courses:
  Education 250—Instructional Media with Lab ................... 3 hours
  Education 251—Instructional Media Lab only .................... 1 hour
  Education 401—History and Philosophy of Education ........ 3 hours
  Education 402—School Organization & Administration ....... 3 hours
  Education 460—Evaluation and Measurement ................... 3 hours
  Education 463—Educational Psychology .......................... 3 hours
  Education 465—Comparative Education ........................... 3 hours

Secondary Certification programs are offered in the following areas.
  Art, Visual ............................................................. Industrial Arts
  Biological Science ..................................................... Languages: French, Spanish
  Bookkeeping-Basic Business ........................................ Mathematics
  Chemistry .............................................................. Music
  Comprehensive Social Studies ....................................... Physical Education
  Driver Education (Validation) ....................................... Physics
  Economics ............................................................. Political Science
  English ................................................................. Sales-Communication
  General Science ....................................................... Social Psychology
  Health ................................................................. Sociology
  History ................................................................. Speech

GENERAL COURSES

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Required of departmental majors. 1 hour.

100. EDUCATION. Areas of competence essential for participation as a citizen in decision making for education: the changing role of the school, the learner and the learning process, values that give direction to education, current issues in education. 3 hours.
250. INSTRUCTIONAL MEDIA IN EDUCATION. Preparation, study and evaluation of instructional materials; their uses in the promotion of the learning process. Includes lab for development of competence in operating audio-visual equipment and preparing instructional materials. 3 hours.

251. INSTRUCTIONAL MEDIA LABORATORY. Development of competence in operating audio-visual equipment and preparing instructional materials. May be taken without Ed. 250. 1 hour.

401. HISTORY AND PHILOSOPHY OF EDUCATION. Modern educational practice; historical changes in instructional processes and ideas; educational beliefs and points of view; the purpose of education in the United States Democracy. 3 hours.

402. SCHOOL ADMINISTRATION AND ORGANIZATION. The United States public school system, its organization and administrative units, and other agencies through which it is managed. The teacher’s role in the organization of a school system. 3 hours. Not offered 73-74.

420. CURRICULUM IMPROVEMENT. Individual and group problems growing out of students’ own school situations. 3 hours. Not offered 73-74.

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

463. EDUCATIONAL PSYCHOLOGY. The learner, the learning process, and conditions that promote learning. Application of psychological principles to teaching in the classroom. 3 hours.

465. COMPARATIVE EDUCATION. The development of education systems in representative countries of the world. A comparison of purposes, programs and structures of education. The interaction of different cultures with their education systems. 3 hours.

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

494. SEMINAR IN EDUCATION. 1-3 hours.

497. INDEPENDENT STUDY IN EDUCATION. In areas of student interest with permission of Department Chairman. 1-3 hours.

ELEMENTARY EDUCATION COURSES

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

260. HANDWRITING METHODS FOR ELEMENTARY TEACHERS. Development of handwriting programs in the elementary school, with proficiency in both manuscript and cursive writing. 1 hour.

261. PHONICS FOR THE ELEMENTARY TEACHER. Development of functional phonics program in the elementary school, including both phonic and structural analysis. 1 hour.
262. SEMINAR IN EVALUATION AND MEASUREMENT IN EDUCATION. Basic areas of evaluation and measurement with emphasis on statistical terminology, test construction and interpretation, survey of evaluative instruments. Required of Elementary Education majors concurrent with first Methods course. 1 hour.

308. TEACHING MATHEMATICS IN THE ELEMENTARY SCHOOL. Content, methods, and materials reflecting the current emphasis in mathematics. Development of functional relationships with other curriculum areas. Prerequisite: 9 hours of college math and Education 223. 3 hours.

309. TEACHING SCIENCE IN THE ELEMENTARY SCHOOL. The role of science in childhood education, the preparation of materials, and organization of learning activities for problem solving. Prerequisite: 10 hours of college science and Education 223. 3 hours.

310. CHILDREN'S LITERATURE. Knowledge and appreciation of children's books. Audiovisual aids, up-to-date study, critical aids and enjoyment of representative selections are utilized. 3 hours.

311. TEACHING SOCIAL STUDIES IN THE ELEMENTARY SCHOOL. Objectives, trends, issues, and evaluation of the teaching of social studies relative to the concepts and principles underlying the disciplines of the social sciences. Prerequisite: Education 223, 15 hours of college Social Sciences. 3 hours.

312. TEACHING LANGUAGE ARTS IN THE ELEMENTARY SCHOOL. Principles and methods of teaching language arts including listening, speaking, English, spelling, and creative experiences in relation to other subjects in the curriculum; the preparation and evaluation of language arts materials. Prerequisite: Education 223, 260, 261, and 18 hours of college English, 3 hours of Speech. 3 hours.

314. TEACHING READING IN THE ELEMENTARY SCHOOL. Materials, principles, and problems underlying the teaching of reading including new concepts, preparation and evaluation of reading materials. Prerequisite: Education 223, 261, 312. 3 hours.

330. KINDERGARTEN METHODS AND MATERIALS. Programs and practices in the kindergarten of four and five-year-olds. Advanced students in education and by special permission. 3 hours. Offered Winter 73-74.

381. THE ELEMENTARY SCHOOL CURRICULUM. An overview of the elementary school program, conceptions of teaching in harmony with basic psychological principles. Prerequisite: 6 hours of elementary methods courses. 3 hours.

410. EDUCATION OF SLOW LEARNING CHILDREN. Introductory: developmental growth and learning characteristics; etiology; diagnosis and differentiation; teacher and learner problems in education. 3 hours. Offered Fall 1973, Seniors and graduates.

411. LANGUAGE ARTS FOR SLOW LEARNING CHILDREN. Introductory: developmental growth and learning characteristics; etiology; diagnosis and differentiation; teacher and learner problems in education. 3 hours. Offered Spring 1974. Seniors and graduates.
412. MATHEMATICS AND SCIENCE FOR SLOW LEARNING CHILDREN. Methods, materials for basic mathematic and science concepts; practical application. 3 hours. Offered Summer, 1974 (tentative). Seniors and graduates.

413. SOCIAL STUDIES FOR SLOW LEARNING CHILDREN. Problems and deviations in civic, social and cultural behavior and adequacy. 3 hours. Offered Fall, 1974 (tentative). Seniors and graduates.

414. OCCUPATIONAL ORIENTATION AND JOB PREPARATION FOR SLOW LEARNING CHILDREN. Emphasis on employable skills and occupational and personal adequacy. 3 hours. Offered Spring, 1975. (Tentative). Seniors and graduates.

416. EDUCATION OF EXCEPTIONAL CHILDREN. Ways to promote learning with atypical school children who are above or below normal expectations of children. From mental, social and physical standpoints. 3 hours. Not offered 73-74.

441. ADVANCED READING METHODS AND MATERIALS. Advanced study of the reading process, comprehension and speed, skills; prevention and treatment of individual problems. Prerequisite: Education 341. 3 hours. Not offered 73-74.

470-471. STUDENT TEACHING IN THE ELEMENTARY GRADES. Planning and teaching under supervision in the elementary grades; weekly seminar on campus. Prerequisites: 2.0 total cumulative average; average of 2.25 with grade of "C" in all required Education courses; Ed. 100, 223, 260, 261, 262, 308, 309, 310, 311, 312, 314; at least four field experiences, 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. 7, 8 or 15 hours.

SECONDARY EDUCATION COURSES

224. ADOLESCENT PSYCHOLOGY. The adolescent, his physical, social, emotional, and intellectual development; in accordance with genetic constitution and environmental forces from birth. Prerequisite: Psychology 100. 3 hours.

342. DEVELOPMENTAL READING IN THE SECONDARY SCHOOL. Principles and materials that aid in developing reading abilities. Diagnosis of reading disabilities. Development of programs to help students improve reading skills. Open to English majors or by permission of the instructor. Prerequisite: Ed. 224. 7-3 hours.

370. SCHOOL AND SOCIETY. Schools in relation to their supporting society; democracy in its relation to schools; the responsibilities of educators to the community and to the school; the nature, type and limitations of both the official and unofficial controls of schools. Prerequisite: Education 224. 3 hours.
375. SCHOOL, SOCIETY AND THE SECONDARY CURRICULUM. The interrelation of society, school and the secondary curriculum; class and laboratory experiences provided in area schools. Schools in relation to their supporting society; democracy in its relation to schools; responsibilities of educators to the community; nature, type and limitations of official and unofficial controls. Secondary school curriculum standards, practices, instructional materials, curriculum development, functions, changes and trends. Prerequisite: Education 224. 6 hours.

380. THE SECONDARY SCHOOL CURRICULUM. Secondary school curriculum standards, practices, instructional materials, curriculum development, functions, changes and trends. Prerequisite: Education 224. 3 hours.

450. TEACHING METHODS IN THE SECONDARY SCHOOL. Methods, devices, and techniques which are most effective in directing learning in the various subject areas at the high school level; observations and participation in actual classroom situations. Prerequisite: Ed. 224. 3 hours.

452. TEACHING METHODS IN HIGH SCHOOL ENGLISH. Methods, devices and techniques which are most effective in directing learning in secondary classes in English; observation, participation and evaluation in actual classroom situations. (Taken 1 hour per quarter for 3 quarters.) Prerequisite: Ed. 224. 1-3 hours.

453. TEACHING METHODS IN HIGH SCHOOL SOCIAL STUDIES. Similar to Education 450. Prerequisite: Edu. 224. 3 hours.

454. TEACHING METHODS IN HIGH SCHOOL MATHEMATICS. Similar to Education 450. Prerequisite: Ed. 224. 3 hours.

455. TEACHING METHODS IN HIGH SCHOOL SCIENCE. Similar to Education 450. Prerequisite: Ed. 224. 3 hours.

456. TEACHING METHODS IN HIGH SCHOOL FOREIGN LANGUAGE. Similar to Education 450. Prerequisite: Ed. 224. 3 hours. Offered on demand.

457. TEACHING METHODS IN HIGH SCHOOL ART. Similar to Education 450. Prerequisite: Ed. 224. 3 hours.

480-481. STUDENT TEACHING—JUNIOR AND SENIOR HIGH SCHOOL. Planning and teaching under supervision in the junior or senior high school full time five days per week in major teaching field; weekly seminar on campus. Prerequisite: senior rank; average of 2.25 or higher in major area plus education, with grade of "C" or better in all required Education courses; 2.0 total cumulative average minimum; Education 100, 224, 375 or 370, 450 or Special Methods; at least four field experiences, 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 Teaching Education and the chairman of his major department. 8 (Special only), or 15 hours.
ENGLISH
(Department 112)

PROFESSORS C. DORNBUSCH (Chairman), PRICE; ASSOCIATE PROFESSORS T. BANKS (Leave of Absence), BECK, F. BENNETT, OLIVER; ASSISTANT PROFESSORS BELCH, A. HUNT, E. MILLER, R. ROBINSON, SHAFER; INSTRUCTOR P. MOORE; LECTURER J. DORNBUSCH.

OBJECTIVES:

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

Advanced courses increasing the breadth and depth of the above objectives are offered as humanities electives and as part of the curriculum for majors who plan to teach in the public school or do graduate study in English.

Career opportunities are available to the English major who takes additional courses in other disciplines to go directly into business or into graduate work in law, medical arts, or business.

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

195 (Counts as L.A. Orientation)
295
305 or 306
311 or 312 or 313
Four of the following: 310, 314, 321, 322, 323, 324, 361, 362, 494. (Two additional quarters of Shakespeare may count toward this requirement.)
Two of the following: 337, 338, 339, 363, 495
351-352
381 (Recommended to be taken in junior year)
410
490 or 494 or 495 (May count as three hours toward the appropriate requirements above)
Two free electives in English

Also required are one year of English History and either (1) intermediate foreign language at the college level or (2) three courses in philosophy beyond Philosophy 100. The major is, however, strongly urged to take both the intermediate language and the three courses in philosophy.

100, 101, 102 do not count toward a major in English, nor does any course with a grade below "C." A Senior Comprehensive—namely, the Undergraduate Record Examination in Literature—is required.

ENGLISH COURSES

100. ENGLISH. Critical thinking and writing based upon studies in fiction. 3 hours.
101. ENGLISH. Critical thinking and writing based upon studies in drama. 3 hours.

102. ENGLISH. Critical thinking and writing based upon studies in poetry. 3 hours.

English 100, 101, 102 may be taken in any order. The student must schedule one of the three courses in English every quarter until he has received credit in all three.

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

195. PROSEMINAR IN ENGLISH. Orientation to the College of Liberal Arts and to the Department of English. Required of all freshman and transfer majors in the fall quarter. Counts as L.A. Orientation. 1 hour.

200. PROBLEMS IN CRITICISM. Definitions of art, literature, and genres; the language of critical statements; concepts of taste; literature in critical perspectives. 3 hours.

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

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

241. NEWS WRITING. The discipline and technique of writing for a newspaper. 3 hours. Graded "S" or "U."

250. JOURNALISM ACTIVITIES—NEWSPAPER.

251. JOURNALISM ACTIVITIES—MAGAZINE.

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

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

295. SEMINAR IN LITERARY THEORY AND APPROACHES. Definitions and functions of literature, critical approaches applied to specific works in the various genres, English bibliography. (Intended for sophomore and transfer majors, fall quarter) 3 hours.

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

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

306. CONTINENTAL RATIONALISM AND ROMANTICISM. European literary masterpieces from the Renaissance to the mid-twentieth century. All works will be read in English translation. 3 hours.
310. ENGLISH LITERATURE BEFORE 1500. Continuity in Anglo-Saxon attitudes and types from Beowulf to Chaucer. Epic, lyric, elegy, narrative with emphasis on medieval romance, and drama, all in translation. 3 hours.

311, 312, 313. SHAKESPEARE. Representative plays and poems with special consideration given to a major comedy, a history play, and two tragedies each quarter. The three courses are independent and complementary; each is designed to afford a cross section of Shakespeare's dramatic art. 9 hours.

314. ENGLISH RENAISSANCE. Selected poetry, prose, and drama of the Elizabethan and Jacobean periods, with emphasis upon Sidney, Spenser, Donne, Marlowe, and Jonson. 3 hours.

321. MILTON. Milton's major lyric poems, Paradise Lost, and Samson Agonistes. 3 hours.

322. RESTORATION AND THE EIGHTEENTH CENTURY. Major writers of the Neoclassical Period. 3 hours.

323. ENGLISH ROMANTICISM. Selected prose and poetry of Blake, Wordsworth, Coleridge, Byron, Shelley, and Keats. 3 hours.

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

325. MODERN POETRY. A survey of modern English and American poets with emphasis on one or two major figures such as Yeats and Frost. 3 hours.

333. MODERN WORLD DRAMA. The study of neoteric and contemporary drama, concentrating on major works and playwrights, including influences, movements and types. 3 hours.

337. AMERICAN LITERATURE: BEGINNINGS. Chronological study of the development of an American literature, including 17th-century colonial writings, Puritan thought and influence, 18th-century idealism and rationalism, and the beginnings of romanticism with Irving and Poe. 3 hours.

338. AMERICAN LITERATURE: MIDDLE PERIOD. Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, and their contemporaries. 3 hours.

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

341. POETRY WRITING. The discipline and technique of writing poetry. 3 hours. Prerequisite: a literature course above the freshman level. Graded "S" or "U." May be continued as 498 (Independent Study in Writing).

342. FICTION WRITING. The discipline and technique of writing fiction. 3 hours. Prerequisite: a literature course above the freshman level. Graded "S" or "U." May be continued as 498 (Independent Study in Writing).
343. FACTUAL WRITING. The theory, method, and practice of writing non-fictional prose, with particular emphasis on the development of effective style. 3 hours. Prerequisite: a literature course above the freshman level. Graded "S" or "U." May be continued as 498 (Independent Study in Writing).

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

361. BRITISH NOVEL I. Development of the novel as a literary form from Defoe to George Eliot. 3 hours.

362. BRITISH NOVEL II. Development of the modern novel as a literary form from Hardy to the present. 3 hours.

363. MODERN AMERICAN FICTION. The development of the American novel after World War I with emphasis on the major novelists. 3 hours.

381. HISTORY OF LITERARY CRITICISM. Movements and major writers of literary criticism. 3 hours.

410. CHAUCER. A study of Chaucer with special emphasis on The Canterbury Tales, some reading of the chief literary forms of the Middle Ages, some skill in understanding and reading Middle English. 3 hours.

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

494. SEMINAR IN ENGLISH LITERATURE. 3 or 6 hours.

495. SEMINAR IN AMERICAN LITERATURE. 3 or 6 hours.

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

498. INDEPENDENT STUDY IN WRITING. 1-3 hours.

FOREIGN LANGUAGES
(Department 113)

ASSOCIATE PROFESSOR MARTINEZ; ASSISTANT PROFESSORS ANIDO, BOLLINGER, LIPPERT (Chairman), SAGONOWSKY, SEILER; INSTRUCTOR MINSKY; ASSISTANT INSTRUCTOR SCHMITZ.

The foreign language program is designed to train students to speak, read and write a foreign language; to insure a strong background in the literature and culture of the people whose language they are studying; to provide the language ability necessary for students to work in a number of fields; to prepare students for graduate work; to train students to be teachers of foreign language at the elementary and secondary levels. (See departmental brochure for descriptions of career opportunities.)

The new air conditioned University Audio Center provides the student with opportunities for language practice and extends his contact with the living language. Recorded materials used in the Center are prepared as an adjunct to class work and are coordinated with class
instruction. Additional materials are also available which give the student ample opportunity for aural comprehension, auditory-visual drill speaking, and self-correction.

Requirements for a major in a foreign language:
For a major in French or Spanish, 45 hours are required above the 100 level courses, to include 411-412-413 (French) or 441-442-443 (Spanish). Students develop individual programs of study with advisors. Ordinarily courses are taken in sequence through the conversation and composition courses. A comprehensive examination is required for graduation.

It is strongly recommended, although not required, that language majors take part in summer study abroad or junior year abroad programs. Faculty advisors assist students in developing these programs of study. Language majors are also encouraged to develop a second academic area of interest in addition to their language major.

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog, library, career and employment opportunities, foreign study opportunities, certification requirements. Required of majors in the department. 1 hour.

100-101. ELEMENTARY FRENCH 1 AND 2. 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. Four class periods and two hours of scheduled laboratory practice per week. 8 hours.

214-215. INTERMEDIATE FRENCH 1 AND 2. A review of fundamentals of grammar and pronunciation. Abundant conversational practice and composition based on short stories, plays, and poetry. Occasional lectures on French life, history, architecture, art, and civilization. Four class periods and two hours of scheduled laboratory practice per week. Prerequisite: 101 or proficiency established by placement examination. 8 hours.

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

311-312-313. FRENCH CONVERSATION AND COMPOSITION. To develop a useful command of the language: readings, slides, recordings, current periodicals and realia are used to stimulate conversation. A study of grammatical and phonetic problems aimed at perfecting clarity and accuracy of expression. Three class periods and two hours of scheduled laboratory practice per week. Prerequisite: 214-215 or proficiency established by placement examination. 12 hours.

314-315-316. SURVEY OF FRENCH LITERATURE. A study of the main currents of French literature. Class discussions based on the reading of representative French masterpieces. Prerequisites: 214-215, 311-312-313. 9 hours.

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

318. THE FRENCH NOVEL. An historical survey of the development of French prose fiction from the Middle Ages to the present. Special emphasis on the literary "isms" and outstanding writers in the XIX century: Stendahl, Balzac, Flaubert, Zola.
319. FRENCH LYRIC POETRY. The middle ages: provençal poetry and "amour courtois" on one hand, Francois Villon the other. Marot, Du Bellay, and Ronsard in relation to the Renaissance. Influence of Malherbe and Boileau. The new tradition beginning with Romanticism: Hugo, Lamartine, Musset, Vigny, G de Nerval; Parnassianism: Theophile Gautier; Baudelaire; the Symbolists: Verlaine, Malarmé, Rimbaud. 3 hours.

411, 412, 413. CIVILISATION FRANÇAISE. A survey of the history of France, its topography, industries, government, educational system, journalism. The course is required of all French majors. Prerequisite: 311-312-313. 9 hours.

416. THE FRENCH THEATRE. Medieval liturgical and non-liturgical dramatic forms. Development of the classical drama and its decline in the eighteenth century. The impact of Romantic drama: the ultimate triumph of the mixed genre. The well-made play and the thesis play at the turn of the twentieth century. Coming of the Théâtre Libre, the new realism, and the Symbolist movement in the theatre. 3 hours.

418. FRENCH LITERATURE OF THE TWENTIETH CENTURY. The impact of Symbolism, Surrealism, Existentialism and two world wars. Anti-theatre, anti-hero, and anti-novel. The revival of classical themes, their re-interpretation for our times. 3 hours.

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

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

GERMAN

102-103. ELEMENTARY GERMAN 1 AND 2. 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. Four class periods and two hours of scheduled laboratory practice per week. 8 hours.

224-225. INTERMEDIATE GERMAN 1 AND 2. Review of the fundamentals of grammar, pronunciation, vocabulary, and idioms; conversational practice and composition; German life, history, civilization, art, music, illustrated with slides, film strips, and motion pictures with German sound tracks. Four class periods and two hours of scheduled laboratory practice per week. Prerequisite: 103 or proficiency established by placement examination. 8 hours.

498. INDEPENDENT STUDY IN GERMAN. 1-3 hours.

SPANISH

104-105. ELEMENTARY SPANISH 1 AND 2. 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 and South America. Four class periods and two scheduled laboratory practices per week. 8 hours.
244-245. INTERMEDIATE SPANISH 1 AND 2. A review of grammar and pronunciation; conversational practice and composition; occasional lectures in Spanish on Spanish life, history, arts, crafts, and civilization, illustrated with film strips, slides, photographs, reproductions, and realia. Four class periods and two hours of scheduled laboratory practice per week. Prerequisite: 105 or proficiency established by placement examination. 8 hours.

341-342-343. SPANISH CONVERSATION AND COMPOSITION. To develop a useful command of the language; recorded dialogues on a variety of topics; color slides, film strips, current periodicals and realia; study of commercial Spanish and practice in correspondence useful to students in business or commerce. A study of grammatical and phonetic problems aimed at perfecting clarity and accuracy of expression. Three class periods and two hours of scheduled laboratory practice per week. Prerequisite: 244-245 or proficiency established by placement examination. 12 hours.

344-345-346. SURVEY OF SPANISH LITERATURE. A study of the chief authors in the literature of Spain from the beginnings to the present. Prerequisite: 244-245, 341-342-343. 9 hours.

347-348-349. SPANISH-AMERICAN LITERATURE. Main currents of Spanish-American literature. Prerequisite: 244-245. 9 hours.

441-442-443. CIVILISACION HISPANICA. This course integrates the political, economic, social, geographical, and cultural forces which have shaped Spain and Hispanic America. Required of all Spanish majors. Prerequisite: 341-342-343. 9 hours.

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

445. SPANISH-AMERICAN FICTION. Romantic novelists, realism and naturalism, modernism, and regionalism. Prerequisite: 347, 348, 349. 3 hours.

446. TWENTIETH CENTURY LITERATURE: THE GENERATION OF 1898. A survey and critical analysis of selected writings of Gavinet, Baroja, Unamuno, Azorin, Benavente, Valle-Inclan, and Antonio Machado. Prerequisite: 344, 345, 346. 3 hours.

447. MODERN SPANISH THEATER. Study and analysis of selected 20th-century Spanish plays. Benavente, Alvarez Quintero, Valle-Inclan, Martinez-Sierra, Garcia Lorca, Casona, and others. 3 hours.

492. SPECIAL TOPICS IN SPANISH. 1-3 hours.

496. SEMINAR IN SPANISH. 1-3 hours.

499. INDEPENDENT STUDY IN SPANISH. 1-3 hours.
HEALTH AND PHYSICAL EDUCATION
(Department 143)

PROFESSOR ENGLISH (Chairman); ASSOCIATE PROFESSORS LUDWIG, ROBERSON; ASSISTANT PROFESSORS DAUGHERTY, JOHNSON, LAUTH, MIDDLETON, J. MILLER, STRAYER; INSTRUCTORS McCORMICK, WALLACE; ASSISTANT INSTRUCTOR LAYNE.

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

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

REQUIRED PHYSICAL EDUCATION SERVICE COURSES

*Physical Education*, two hours per week. One credit each quarter for the first three quarters. One of the three required hours must be taken in the gymnasium. However, the other two hours may be taken in the gymnasium or in McIntosh Center. These hours are not sequential and must be completed prior to senior status. None of the elective courses may be repeated. Additional laboratory fees are charged for bowling, billiards and co-ed archery.

The physical education courses are given out-of-doors, in McIntosh Center and the gymnasium. They are systematically graded and arranged to fit the needs and interest of the individual.

001-002-003. PHYSICAL EDUCATION MEN. Gymnasium and outdoor classes in season, natural gymnastics, informal play. 1 credit hour, per quarter.

007. IN-SEASON VARSITY SPORT PARTICIPATION. 1 hour.

010. P.E. CO-ED. BOWLING. Instruction, practice and participation in the skill of Bowling. 1 hour.

040. P.E. CO-ED. BILLIARDS. Instruction, practice and participation in the skill of Billiards. 1 hour.

050. P.E. CO-ED. SOCIAL DANCE. Instruction, practice and participation in the Social Dance. 1 hour.

060. P.E. CO-ED. ARCHERY. Instruction, practice, and participation in the skill of Archery. 1 hour.

143-070 to 143-081. PHYSICAL EDUCATION WOMEN. 1 hour each.
070. FOUNDATIONS OF MOVEMENT.
071. DANCE AND FREE EXERCISE.
072. RHYTHMS AND DANCE.
073. MODERN DANCE AND GOLF.
074. TENNIS AND VOLLEYBALL.
075. SOCCER AND VOLLEYBALL.
076. SOFTBALL AND TRAMPOLINE.
077. BASKETBALL.
078. BADMINTON AND TRAMPOLINE.
079. GYMNASTICS.
080. NET SPORTS AND TENNIS.
081. ARCHERY & RECREATIONAL GAMES.
(Note: A student cannot take both 074 and 080 for credit.)

082. SPORTS APPRECIATION.

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

Women: softball, volleyball, basketball, free throws, timed basketball shooting, badminton, table tennis, tennis, archery and track and field.

MAJOR IN HEALTH AND/OR PHYSICAL EDUCATION

A copy of the curricula for the six areas of certification the Health and Physical Education Department offers may be obtained from the Chairman of the Department. In addition to the requirements listed in the Physical Education major curriculum (K-12), a student majoring in Physical Education is required to be affiliated in some capacity with one of the major sports in the intercollegiate program.

A senior comprehensive examination is required of all majors. The six areas of certification offered by the department are listed below:

*K-12 Health and Physical Education (Dual) 7-12 Physical Education
*K-12 Physical Education 7-12 Health Education
*K-12 Health Education K-6 Elementary Physical Education

*The indicated areas of certification are the only areas that the department recognizes as a major.

The other areas of certification require a college major in another discipline. For specific information concerning these areas of certification, contact the Department Chairman.

The following courses indicated by asterisks are required professional courses for the physical education major:
000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalogue and library. Required of all majors in the department. 1 hour.

111. CURRENT PERSONAL HEALTH PROBLEMS (formerly Hygiene 110). The identification and study of timely health issues from a personal viewpoint. 3 hours.

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

*121. COMMUNITY HEALTH. The study of those health matters involving virtually all citizens with focus on health problems amenable to community action, the benefits of which are channeled to individual citizens. 3 quarter hours.

*141-142-143. PHYSICAL EDUCATION FOR MAJORS (MEN). Physical Education 141, 142, 143 are required of all students majoring or minoring in Physical Education. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities: 1 hour each.

141. SPEEDBALL, TOUCH FOOTBALL, GAMES OF LOW ORGANIZATION.

142. TUMBLING, WRESTLING.

143. TRAMPOLINE, TENNIS.

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

*147. BASIC MOVEMENT (CO-ED.) The principles and laws of motion as applied to basic human movement and performance. An introduction to the basic locomotor and axial movements possible in the human body and the utilization of these basic movements as they are combined in the efficient performance of complex tasks. 3 hours.

*148, 149. PHYSICAL EDUCATION FOR MAJORS (WOMEN). Individual Activities. Required of all women physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities. 148. BADMINTON & TRAMPOLINE; 149. TENNIS. 1 hour each quarter.

*201-202-203. PHYSICAL EDUCATION FOR MAJORS (MEN) Physical Education 201, 202, 203 are required of all men students majoring in Physical Education. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities: 1 hour each.

201. SOCCER, FLASHBALL, GAMES OF LOW ORGANIZATION.

202. PARALLEL BARS, BADMINTON, WEIGHT LIFTING.
203. VOLLEYBALL, HORIZONTAL BAR.

*204. PHYSICAL EDUCATION FOR MAJORS (CO-ED) RHYTHMIC ACTIVITIES. Required of all physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in Rhythmic fundamentals and exercise to music. 1 hour.

*205. PHYSICAL EDUCATION FOR MAJORS (WOMEN) RHYTHMIC ACTIVITIES. Required of all women physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching Modern and Social Dance. 1 hour.

*206. PHYSICAL EDUCATION FOR MAJORS (CO-ED) RHYTHMIC ACTIVITIES. Required of all physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in Folk and Square Dance. 1 hour.

*207, 208, 209. PHYSICAL EDUCATION FOR MAJORS (WOMEN) Individual Activities. Required of all women physical education majors. To assist the prospective physical educator in acquiring the fundamental skills and developing the methods of teaching in the following activities; 207-Archery and tumbling; 208-Gymnastics, apparatus; 209-Recreational games and golf. 1 hour each quarter.

*222. SCHOOL HEALTH. Skills and knowledges for aiding teachers and others to observe and understand the school child in health and illness; the health program of the public schools and the relationship of the school to the students' habits, attitudes, and knowledges conducive to good health. 3 hours.

*223. KINESIOLOGY. 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, analysis of movement. Prerequisites: Physiology 231 and 232. 3 hours.

*233. PHYSICAL EDUCATION FOR THE ELEMENTARY SCHOOL. The aims, objectives, methods, and techniques of teaching physical education in the elementary school. The need for physical activity and practical application of theories are emphasized. Prerequisite: Sophomore standing. 3 hours.

*271. MOTOR LEARNING. The study of principles and theories relating to relatively permanent change in performance on behavioral potential resulting from practice or past experience in the situation. 3 hours.

*301. PRINCIPLES OF HEALTH AND PHYSICAL EDUCATION. The aims, objectives, methods of teaching health and physical education in the public schools. Lectures, demonstrations, physical education, and health from the standpoint of general education. Prerequisite: 1 year Physical Education for Majors and Junior status. 3 hours.

*302. HISTORY AND PRINCIPLES OF HEALTH AND PHYSICAL EDUCATION. A continuation of HPE 301. Includes a History of Health and Physical Education. Prerequisite: 1 year of Physical Education for Majors and Junior Status. 3 hours.
*303. ORGANIZATION AND ADMINISTRATION OF HEALTH AND PHYSICAL EDUCATION. Discussion and consideration of the basic problems in the organization and administration of Health and Physical Education. Prerequisite: 1 year of Physical Education for Majors and Junior Status. 3 hours.

*304, 305, 306. PRACTICAL TECHNIQUES OF TEACHING AND ASSISTING IN HEALTH AND PHYSICAL EDUCATION. Two hours required of all Physical Education Majors in their Junior year. 1 hour each.

**Men Physical Education Majors are required to complete 9 of the 12 hours.

**320. THE THEORY OF COACHING WRESTLING (MEN). Equipment, fundamentals of the art and skill of wrestling. Prerequisite for students seeking state certification in Physical Education, Junior status. 3 hours.

**321. THE THEORY OF FOOTBALL COACHING (MEN). Equipment, fundamentals of the game, kicking, passing, handling the ball, tackling, blocking; individual position play; offensive and defensive formations; strategy and generalship. Prerequisite for students seeking state certification in Physical Education, Junior status. 3 hours.

**322. THE THEORY OF COACHING BASKETBALL (MEN). The fundamentals, passing, shooting, dribbling, feinting, and pivoting, styles of offense and defense, equipment, conditioning, the handling of a team in games. Lectures, demonstrations and practice. Prerequisite for students seeking state certification in Physical Education, Junior Status. 3 hours.

**323. THE THEORY OF COACHING BASEBALL AND TRACK (MEN). Individual position and team play in men’s baseball. Methods and forms for all of the events in track and field. Lectures, reports, demonstration and practice. Prerequisite: for students seeking state certification in Physical Education, Junior status. 3 hours.

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

*325. OFFICIATING FOR WOMEN. To develop knowledge and techniques for officiating women’s volleyball and basketball games. Prerequisite: Physical Education. 2 hours.

*326. CO-CURRICULAR ACTIVITIES (WOMEN). Theory and practice of the organization and administration of co-curricular activities commonly associated with the girls’ physical education program. 2 hours.

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

334-335-336. ADVANCED COACHING PRACTICE (WOMEN). To give women students who have had courses 324-325-326 an opportunity to do actual coaching under supervision in all sports in season. Hours arranged. 1-3 hours per quarter.
341. FOOTBALL OFFICIATING. This course includes the study of the football rules from the standpoint of the player, coach and official. 3 hours.

342. BASKETBALL OFFICIATING. The study of basketball rules from the standpoint of player, coach and official. 3 hours.

343. ATHLETIC TRAINING AND CONDITIONING. To meet the need of the high school coach; training procedures and conditioning of athletic teams for all sports; treatment of athletic injuries. 3 hours.

350. HEALTH METHODS AND EVALUATION. For the special teacher and supervisor of Health and Physical Education; teachers health; health problems arising in a school system; methods and materials for teaching health and evaluation. Prerequisites: 2 quarters of Health and Junior standing. 3 hours.

*402. ADAPTIVE AND CORRECTIVE PHYSICAL EDUCATION. For the teachers who are concerned with the education of the handicapped; to develop an understanding of the various handicapping conditions and to explore methods of adapting physical activities to meet the needs of the typical student in the physical education class. Prerequisite: 143; 223. 3 hours.

433. DRIVER EDUCATION. For those who plan to teach driving in the public schools. Offered in summer. 3 hours.

434. ORGANIZATION AND ADMINISTRATION OF DRIVER AND TRAFFIC SAFETY. Organizational and administrative aspects of driver and traffic education as they relate to the total school and other specialized programs. Historical and philosophical aspects, evaluation, related professional organizations and occupational opportunities. Prerequisite: Physical Education 433. Offered in summer. Tentative 3 hours.

HISTORY AND POLITICAL SCIENCE (Department 132)

PROFESSORS DARLINGTON, HILLIARD, MILNAR; ASSOCIATE PROFESSORS DAVIS (Chairman), SAFFELL, SOBERS; ASSISTANT PROFESSORS HAMMOND, LUDANYI; INSTRUCTOR S. BENNETT.

The WILFRED E. BINKLEY CHAIR OF HISTORY AND POLITICAL SCIENCE, made possible by a grant from The Carthage Foundation of Pittsburgh, has been inaugurated. The 1973-74 recipient of this fully-endowed professorship is Robert H. Hilliard, Professor of History.

The KERNAN ROBSON CHAIR IN POLITICAL SCIENCE, made possible by a trust established by Kernan Robson, deceased, has been inaugurated. The 1973-74 recipient of this partially-endowed professorship is Mary K. Hammond, Assistant Professor of Political Science.

HISTORY

In addition to receiving a quality education in the time-honored Liberal Arts tradition, the major in history generally prepares for a career in teacher education, the law, journalism, government service and business. A more descriptive analysis of career opportunities for history majors may be obtained from the department chairman.

The history courses themselves stress the evolution of human institutions with a view to
developing an informed appreciation of past events as well as an understanding of our present civilization. Students majoring in history are expected to take courses in both American and non-American History and electives in the allied social sciences: political science, sociology, geography and economics. In addition to the 48 hours required for the major in history, the student must complete nine hours in political science (201-202-203). It should be noted that Human Geography 400 and Physical Geography 433 do not count as part of the history major. For those majors who subsequently plan to attend graduate school, it is strongly recommended that an emphasis be placed on modern foreign languages, especially French and German. A Senior Comprehensive Examination is not required.

**SPECIFIC REQUIREMENTS: HISTORY MAJOR**

(1) Orientation 000
(2) History 100
(3) Political Science 201-202-203
(4) History 211-212-213
(5) Six hours from among the following history courses: 221, 222, 223, 224 and 225
(6) History 303 or History 365
(7) History 321-322-323 or History 411-412-413
(8) History 494
(9) History Electives: 15 hours
Total = 48 Hours + 9 Hours Cognate

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Required of departmental majors. Also listed as Political Science 000. 1 hour.

100. HISTORY. Concepts and trends in world history. A conceptual and thematic approach to the meaning and content of history. 3 hours.

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

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

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

221. CONTEMPORARY EUROPE. An examination of the political, socio-economic and intellectual development of Europe since the conclusion of the second World War. Also listed as Political Science 221. 3 hours. Open to freshmen.

222. CONTEMPORARY ASIA. An examination of the political, socio-economic and intellectual development of Asia since the conclusion of the second World War. Also listed as Political Science 222. 3 hours. Open to freshmen.

223. CONTEMPORARY AFRICA. An examination of the political, socio-economic and intellectual development of Africa since the conclusion of the second World War. Also listed as Political Science 223. 3 hours. Open to freshmen.
224. CONTEMPORARY MIDDLE EAST. An examination of the political, socio-economic and intellectual development of the Middle East since the conclusion of the second World War. Also listed as Political Science 224. 3 hours. Open to freshmen.

225. CONTEMPORARY LATIN AMERICA. An examination of the political, socio-economic and intellectual development of Latin America since the conclusion of the second World War. Also listed as Political Science 225. 3 hours. Open to freshmen.

303. HISTORY OF OHIO. The political and cultural evolution of the state from prehistoric times to the present. 3 hours.

321. ENGLISH HISTORY TO 1603. 3 hours.

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

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

326. MEDIEVAL EUROPE. Europe from the decline of the Roman Empire to the beginning of the Renaissance. Special attention is given to those institutions most instrumental in shaping modern European development. 3 hours. Alternate years, 1974-75.

327. THE FRENCH REVOLUTIONARY ERA. The French Revolution and Napoleon, with the philosophical background and ideological development of the period, together with their effect on later history. 3 hours. Alternate years, 1973-74.

328. RENAISSANCE AND REFORMATION. The political evolution of the Italian communes; the cultural development of the period; the Church and European society during the late Middle Ages and Luther and the expansion of Protestantism in Europe. 3 hours. Alternate years, 1973-74.

329. AGE OF EUROPEAN ABSolutISM. A survey of European civilization during the Early Modern Period (1500-1789) with an emphasis on the development of the national state system, the concepts of divine right monarchy and absolutism, and the eighteenth century Enlightenment. 3 hours. Alternate years, 1973-74.

331-332-333. U.S. CONSTITUTIONAL DEVELOPMENT. A historical and legal approach to the interpretation of the constitution. Also listed as Political Science 331-332-333. 9 hours.

341-342. AMERICAN FOREIGN RELATIONS. The inception, development and present interpretation of the major foreign policies of the United States. Also listed as Political Science 341-342. 6 hours. Alternate years, 1973-74.

351. ANCIENT NEAR EAST AND GREECE. The political, socio-economic and cultural development of pre-Greek Oriental and Greek civilization during the ancient period. 3 hours.

352. ANCIENT ROME. The political, socio-economic and cultural development of Roman civilization during the ancient period. 3 hours.
362. RECENT AMERICAN HISTORY. An intensive study of the major factors in United States
history since 1945. 3 hours.

365. AFRO-AMERICAN HISTORY. The essential facts, trends and interpretations in the history
of the black American from his African beginnings down to the present time. 3 hours.
Alternate years, 1974-75.

377. HISTORY OF MODERN GERMANY. A survey of German history from 1871 to 1945,
Particular emphasis will be on the Bismarckian era, German involvement in the first World
War, and the rise and fall of the Nazi regime. 3 hours. Alternate years, 1973-74.

378. HISTORY OF MODERN FRANCE. A survey of French history from 1871 to 1945. 3 hours.
Alternate years, 1973-74.

381. THE WESTWARD MOVEMENT IN THE UNITED STATES. Territorial expansion from colon-
nial times to the end of the nineteenth century, emphasizing Indian relations, land policies,
transportation and trade, and the influence of the West on American ideals and institutions.
3 hours. Alternate years, 1973-74.

384. CLASSICAL AND MEDIEVAL POLITICAL THOUGHT. The theories of Plato, Aristotle,
Cicero, Augustine and Aquinas concerning the needs of man and the objectives, characteris-
tics and consequences of political order and change. Also listed as Political Science 384. 3
hours.

385. REFORMATION AND SECULAR POLITICAL THOUGHT. The theories of Machiavelli,
Luther, Calvin, Hobbes, Locke, Rousseau, and Montesquieu concerning the sources and objec-
tives of political authority. Also listed as Political Science 385. 3 hours.

386. MODERN AND IDEOLOGICAL POLITICAL THOUGHT. The theories of Burke, Tocque-
ville, Bentham, Mill, Hegel, Marx, Nietzsche and Lenin concerning man and his place in the
political order. Also listed as Political Science 386. 3 hours.

387. AMERICAN POLITICAL THOUGHT. An examination of American political theory com-
mencing with the colonial period and proceeding to modern political thinkers. Also listed as
Political Science 387. 3 hours.

411, 412, 413. RUSSIAN HISTORY. Russia from Peter the Great to the present. 9 hours.
Alternate years, 1974-75.

451. HISTORY OF LAW. A survey of the evolving principles of law as an instrument of social
control, with an examination of legal norms as developed in Greek and Roman systems, canon
law, law merchant and law maritime, civil law, common law and equity, and the Asiatic system.
Also listed as Political Science 451. 3 hours. Alternate years, 1973-74.

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

494. SEMINAR IN HISTORY. 1-3 hours.

497. INDEPENDENT STUDY IN HISTORY. 1-3 hours.
POLITICAL SCIENCE

In addition to receiving a quality education in the time-honored Liberal Arts tradition, the major in political science generally prepares for graduate study in government, for the study of law, for entrance into the public or foreign service, or for effective participation in politics as a citizen. A more descriptive analysis of career opportunities for political science majors may be obtained from the department chairman.

Political science majors are advised to pursue courses in related social science disciplines such as history, sociology and economics. For those majors hoping to attend graduate school and for those planning on a career in the foreign service, extensive work in foreign languages, especially French and German, is strongly recommended. In addition to the 48 hours of political science required of the major, United States History 211-212-213 must be taken. It should be noted that Human Geography 400 and Physical Geography 433 are not applicable to the political science major. A Senior Comprehensive Examination is not required.

SPECIFIC REQUIREMENTS: POLITICAL SCIENCE MAJOR
(1) Orientation 000
(2) Political Science 105
(3) Political Science 201-202-203
(4) History 211-212-213
(5) Six hours from among the following political science courses: 221, 222, 223, 224 and 225
(6) Political Science 384
(7) Six hours from among the following political science courses: 385, 386 and 387
(8) Political Science 495
(9) Political Science Electives: 18 hours

Total = 48 Hours + 9 Hours Cognate

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Required of departmental majors. Also listed as History 000. 1 hour.

105. POLITICAL SCIENCE. Fundamental concepts of governmental systems, including the basic sources of governmental policies and the process of implementation. 3 hours.

201-202. AMERICAN NATIONAL GOVERNMENT. The origin, development, structure and functions of the national government in the United States. 6 hours. Open to freshmen.

203. AMERICAN STATE GOVERNMENT. The origin, development, structure and functions of state government in the United States. 3 hours.

221. CONTEMPORARY EUROPE. An examination of the political, socio-economic and intellectual development of Europe since the conclusion of the second World War. Also listed as History 221. 3 hours. Open to freshmen.

222. CONTEMPORARY ASIA. An examination of the political, socio-economic and intellectual development of Asia since the conclusion of the second World War. Also listed as History 222. 3 hours. Open to freshmen.
223. CONTEMPORARY AFRICA. An examination of the political, socio-economic and intellectual development of Africa since the conclusion of the second World War. Also listed as History 223. 3 hours. Open to freshmen.

224. CONTEMPORARY MIDDLE EAST. An examination of the political, socio-economic and intellectual development of the Middle East since the conclusion of the second World War. Also listed as History 224. 3 hours. Open to freshmen.

225. CONTEMPORARY LATIN AMERICA. An examination of the political, socio-economic and intellectual development of Latin America since the conclusion of the second World War. Also listed as History 225. 3 hours. Open to freshmen.

312. URBAN GOVERNMENT. Problems of urban, suburban and metropolitan government in the United States. 3 hours. Alternate years, 1973-74.

331-332-333. U.S. CONSTITUTIONAL DEVELOPMENT. A historical and legal approach to the interpretation of the constitution. Also listed as History 331-332-333. 9 hours.

334. WESTERN DEMOCRATIC POLITICAL SYSTEMS. A comparison of the politics of England, France and Germany, stressing the impact of political culture and the operations of governmental institutions, parties and interest groups in the process of public policy-making. 3 hours. Alternate years, 1974-75.

335. COMMUNIST POLITICAL SYSTEMS. A comparison of the politics of Yugoslavia, Hungary and Rumania, stressing the operations of the single-party control system, the role of governmental agencies and ideological orientations. 3 hours. Alternate years, 1974-75.

336. DEVELOPING POLITICAL SYSTEMS. A comparison of the politics of Mexico, Egypt and Burma, stressing the impact of cultural fragmentation, modernization, social unrest and rising expectations on the stability and effectiveness of governmental institutions and processes. 3 hours. Alternate years, 1974-75.

337. MAJOR ASIAN POLITICAL SYSTEMS. A comparison of the politics of China, India and Japan, with particular emphasis on the processes of leadership selection, interest identification and public decision making. 3 hours. Alternate years, 1973-74.

341-342. AMERICAN FOREIGN RELATIONS. The inception, development and present interpretation of the major foreign policies of the United States. Also listed as History 341-342. 6 hours. Alternate years, 1973-74.

345. CONDUCT OF AMERICAN FOREIGN RELATIONS. Major factors related to the formulation of foreign policy. 3 hours. Alternate years, 1973-74.

347. AMERICAN POLITICAL PARTIES. The leadership, organization, activities and role of the major political parties in the American political process. 3 hours.

357. PRESSURE GROUPS AND PUBLIC POLICY. The role of pressure groups in the formulation of American domestic and foreign policy. 3 hours. Alternate years, 1974-75.
358. PUBLIC OPINION AND POLLING TECHNIQUES. An examination of the formulation, characteristics and role of public opinion in American politics. An attempt will be made to provide first-hand polling experience in the field. 3 hours. Alternate years, 1974-75.

363-364. PUBLIC ADMINISTRATION AND ORGANIZATION. The nature and function of public organizations; structure, management and control. 6 hours. Alternate years, 1973-74.

371. INTERNATIONAL RELATIONS. The forces which determine the policies of nation-states and their organizations in the international setting. 3 hours.

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

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

384. CLASSICAL AND MEDIEVAL POLITICAL THOUGHT. The theories of Plato, Aristotle, Cicero, Augustine and Aquinas concerning the needs of man and the objectives, characteristics and consequences of political order and change. Also listed as History 384. 3 hours.

385. REFORMATION AND SECULAR POLITICAL THOUGHT. The theories of Machiavelli, Luther, Calvin, Hobbes, Locke, Rousseau and Montesquieu concerning the sources and objectives of political authority. Also listed as History 385. 3 hours.

386. MODERN AND IDEOLOGICAL POLITICAL THOUGHT. The theories of Burke, Tocqueville, Bentham, Mill, Hegel, Marx, Nietzsche and Lenin concerning man and his place in the political order. Also listed as History 386. 3 hours.

387. AMERICAN POLITICAL THOUGHT. An examination of American political theory commencing with the colonial period and proceeding to modern political thinkers. Also listed as History 387. 3 hours.

421. GOVERNMENT OF THE SOVIET UNION. Demographic, historical and ideological basis of Soviet rule. The social, political and governmental structure, the Church, army, courts and organs of police. 3 hours. Alternate years, 1974-75.

422. FOREIGN POLICY OF THE SOVIET UNION. Factors in Russian foreign policy; the early years, as affected by Marxian ideology, internal conditions and foreign interference; limited cooperation with Western Powers; Second World War and aftermath. 3 hours. Alternate years, 1973-74.

424. THE AMERICAN EXECUTIVE. A detailed analysis of the institutions, functions and problems of the American Presidency and the federal executive branch of government. Subjects discussed will include presidential leadership, staffing, executive-legislative relations and policy formation. Additionally, comparative references to executive processes in other political systems will be made. 3 hours. Alternate years, 1974-75.
425. **THE AMERICAN LEGISLATIVE PROCESS.** An in-depth study of the organization and functioning of American legislative bodies, with particular attention to Congress and the state legislatures. Topics will include the function and membership of legislative bodies, committee systems, executive-legislative relations, pressure groups and lobbying. 3 hours. Alternate years, 1974-75.

426. **THE AMERICAN LEGAL SYSTEM.** The structure and function of the American legal system. Topics to be explored will include the role of the courts, the nature of jurisprudence, the origin of law, the concept of legality and the interrelationships of judges, lawyers, police, political officials, bureaucrats and the people. 3 hours. Alternate years, 1974-75.


432. **GOVERNMENT REGULATION OF BUSINESS.** Development of governmental regulation of economic affairs in the United States, provisions of the U.S. Constitution, leading court opinions and the regulatory laws of recent years. 3 hours. Alternate years, 1974-75.

451. **HISTORY OF LAW.** A survey of the evolving principles of law as an instrument of social control, with an examination of legal norms as developed in Greek and Roman systems, canon law, law merchant and law maritime, civil law, common law and equity, and the Asiatic system. Also listed as History 451. 3 hours. Alternate years, 1973-74.

491. **SPECIAL TOPICS IN POLITICAL SCIENCE.** 1-3 hours.

495. **SEMINAR IN POLITICAL SCIENCE.** 1-3 hours.

498. **INDEPENDENT STUDY IN POLITICAL SCIENCE.** 1-3 hours.

**DUAL MAJOR: HISTORY & POLITICAL SCIENCE**

Many students, especially those interested in pre-graduate school or pre-law school studies, find it appropriate to major in both history and political science. For those interested in pursuing a dual major program in history and political science, the following curriculum is required.

1. Orientation 000
2. History 100
3. Political Science 105
4. Political Science 201-202-203
5. History 211-212-213
6. Political Theory 384-385-386-387
7. History 494
8. Political Science 495
9. Twelve hours from among the following contemporary courses: 221, 222, 223, 224 and 225.
10. Twelve hours from among the following history courses: 303, 321, 322, 323, 326, 327, 328, 329, 351, 352, 362, 365, 377, 378, 381, 411, 412, 413, 490 and 497.
(12) Twelve hours from among the following history and political science courses: 331, 332, 333, 341, 342 and 451.

GRAND TOTAL HOURS REQUIRED: 90

DEPARTMENTAL ADVISING: PRELAW & TEACHER EDUCATION

In addition to a corps of regular academic advisors, the department also provides more specialized prelaw and teacher education advisement. Normally, history and political science majors interested in prelaw studies will be assigned to the departmental prelaw advisor, who not only assists the student in making a judicious selection of courses, but also maintains a law school catalog library and acts as the department's central information officer in matters related to prelaw education. Similarly, history and political science majors interested in a teaching career will be assigned to the departmental teacher education advisor, who not only provides academic advice and guidance, but also supervises the departmental aspects of the student teaching program.

GEOGRAPHY

Although the geography courses do not count toward the completion of a history or a political science major, students are encouraged to take one or both of these courses as free electives. It should also be noted that neither Geography 400 nor Geography 433 can be used to complete the social science in-depth requirement in the College of Liberal Arts.

400. HUMAN GEOGRAPHY. The interaction of man and his physical environment. 3 hours. Does not apply to history or political science major requirements.

433. PHYSICAL GEOGRAPHY. A study and unification of the body of knowledge encompassing the earth sciences which give general insight into the nature of man's physical environment. 3 hours. Does not apply to history or political science major requirements.

SOCIAL STUDIES COMPREHENSIVE CERTIFICATION

Although Ohio Northern University does not make provision for a Social Studies Comprehensive major in its curriculum, the student may effectively utilize his free electives by taking the appropriate additional courses which will qualify him for teaching certification in Social Studies Comprehensive by the State of Ohio.

HISTORY WITH EDUCATION MAJORS

In addition to completing the official history major (48 hours) and the appropriate teacher education courses, the student must take the following:

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<th>POLITICAL SCIENCE 105</th>
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<td>POLITICAL SCIENCE 201</td>
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<td>ECONOMICS 100</td>
<td>ANTHROPOLOGY 330</td>
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<td>ECONOMICS 201</td>
<td>SOCIAL STUDIES ELECTIVES: 8 Hours*</td>
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<td>ECONOMICS 202</td>
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<td>GEOGRAPHY 400 or 433</td>
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*The eight (8) hours of electives must all be taken in the same field (Political Science or Economics or Sociology).
POLITICAL SCIENCE WITH EDUCATION MAJORS

In addition to completing the official political science major (48 hours) and the appropriate teacher education courses, the student must take the following:

HISTORY 100
HISTORY 211
HISTORY 212
HISTORY 213
ECONOMICS 100
ECONOMICS 201
ECONOMICS 202

SOCIOLGY 105
SOCIOLGY 204*
SOCIOLGY 205*
GEOGRAPHY 400 or 433
ANTHROPOLOGY 330
HISTORY ELECTIVES (100/200): 6 Hours
HISTORY ELECTIVES (300/400): 9 hours

GRAND TOTAL HOURS: 100

*Both of these courses are recommended although the completion of either will satisfy the state requirement.

The student should be aware of the fact that an additional quarter of work, especially in the case of political science with education, may be necessary to complete the entire social studies comprehensive program.

INDUSTRIAL ARTS
(Department 142)

PROFESSOR KAIN (Chairman); ASSOCIATE PROFESSOR REX; INSTRUCTOR GUILFORD.

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

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

Courses are offered that are of value to both men and women students concentrating in other fields. The recommended courses are: 200 Arts and Crafts, 311 Graphic Arts, 323 Lapidary and Jewelry, 330 Photography, 490 Special Topics in Industrial Arts.

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

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

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

An orientation course (110, 3 hours) designed to assist students in adjusting themselves to college life and to develop a better understanding of the profession is required of all students.
seeking a major or minor in Industrial Arts. This course should 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. A Senior Comprehensive Exam, including a major project exhibition, is required.

110. INDUSTRIAL ARTS ORIENTATION. Orientation and adjustment to college life. An introduction to Industrial Arts; philosophical origins and contemporary practices. The fundamental procedures, operations, and special equipment for each of the several areas of Industrial Arts are briefly explored. Public school visitations. 3 hours.

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

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

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

200. ARTS AND CRAFTS. Laboratory experiences in working with craft materials: copper, brass, aluminum, wood, plastics, leather, gemstones, textiles, ceramics and others. 3 hours.

213. WOOD TECHNOLOGY. The nature of wood, and its present day applications; forestry, lumbering, grading, preserving, and utilization of wood products and by-products; the identification of common commercial lumbers, strength analysis, control of shrinkage, methods of preservation and beautification; wood fabrication and joining techniques. The study of mass-production as applied to wood fabrication and joining techniques. 3 hours.

310. ELEMENTARY SCHOOL INDUSTRIAL ARTS. To introduce prospective elementary teachers to the basic hand tools and their proper manipulation in simple constructional activities. Practical unit development, subject integration. 3 hours.

311. GRAPHIC ARTS. The manipulation processes of duplicating written communications: process printing, mimeographing, spirit duplicating, diazo, block printing, etching, letterpress and offset printing. 3 hours.

313. METAL CASTING. Foundry pattern design and construction; the study of molding materials and equipment; operations and procedures in the construction of sand molds; core construction; melting, pouring and casting of non-ferrous metals. Properties of metals and their alloys. 3 hours.
321. METALWORK TECHNOLOGY. Fundamentals of general metalwork; layout and pattern drafting, bending, forming, seaming, soldering, resistance and oxyacetylene welding and machining; wrought iron work; construction of fixtures, tools, ornaments, and furniture. 5 hours.

322. PRINTING. A historical study of printing with typical exercises in composition, typography, imposition, principles of display. Platen press, cylinder press and offset press operations. 3 hours.

323. LAPIZ HARY AND JEWELRY. The fundamentals of the art of lapidary; working with natural and synthetic stones including the sawing, shaping, polishing and mounting of jewelry stones. 3 hours.

330. PHOTOGRAPHY. Techniques of photographic composition, camera types and accessories, photographic optics, and laboratory methods and materials; dark room developing and printing of negatives. 3 hours.

331. FURNITURE DESIGN AND CONSTRUCTION. Advanced cabinetry procedures; and techniques in joinery and decorative treatments such as carving, turning, veneering, inlaying, fluting, and associated styling elements. One major project is required. Prerequisites: Industrial Arts 110, 212. 3 hours.

332. METAL MACHINING AND MANUFACTURING. Production practice and metalwork technology. The engine lathe, shaper, milling machine, grinder, and power hack-saw; machining of bar stock and castings. Prerequisite: Metalwork Technology 321. 5 hours.

341. FINISHING METHODS AND MATERIALS. Finishing materials, their composition, qualities, and characteristics; protective agents and preservatives; mixing and matching colors; interior floor and wall treatments and finishes; the application of various finishes to wood and metal. 3 hours.

343. WELDING THEORY AND PRACTICE. Welding theory, and weld types; welding metallurgy; electrical resistance and arc welding, oxyacetylene welding, brazing, and burning; welded metal fabrications. 5 hours.

350. CERAMICS. (See Department of Art, Ceramics 350.)

353. CARPENTRY AND WOOD STRUCTURES. The utilization of efficient construction practices in the building of modern wood structures; use of carpentry tools and power equipment. Prerequisite: Technical Drawing 111, Industrial Arts 110. 3 hours.

402. FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS. The principles of electricity and their application to laboratory experiments and to the construction of a variety of electrical devices; introduction to electronics; vacuum tubes, rectifiers, power supplies, amplifiers, oscillators, transmitters, and receivers. 5 hours.

412. LABORATORY PLANNING AND EQUIPMENT SELECTION. The architectural features, selection, arrangement, and maintenance of equipment of the modern Industrial Arts laboratory. Prerequisite: Same as 423 Industrial Arts Organization and Methods. 3 hours.
423. INDUSTRIAL ARTS ORGANIZATION AND METHODS. A professional course in the methods of teaching Industrial Arts: objectives, preparing lesson plans, organizing courses, laboratory procedures, instructional materials, and administrative practices. Visitations to representative high school laboratories. Open to students having 30 hours or more of Industrial Arts courses. 5 hours.

450. INDUSTRIAL PLASTICS. A general overview of the plastics and synthetics industries. The course examines the processes; the associated application of procedures, materials, equipment and current practices of the industry. Laboratory experiments and production projects are required. 3 hours.


460. INDUSTRIAL MATERIALS AND PROCESSES. A study of the basic concepts of materials science. Electrical, electronic, chemical and mechanical properties of materials. Metals. Organic materials. The manufacturing processes involved in industrial production; classroom discussions, technical motion pictures, and field trips to refineries, mines, quarries, mills, kilns, foundries, factories and other manufacturing firms. 5 hours.

480. STUDENT TEACHING IN INDUSTRIAL ARTS EDUCATION. See Education 480. 15 hours.

490. SPECIAL TOPICS IN INDUSTRIAL ARTS. 1-3 hours.

494. SEMINAR IN INDUSTRIAL ARTS. 1-3 hours.

497. INDEPENDENT STUDY IN INDUSTRIAL ARTS. 1-3 hours.

MATHEMATICS
(Department 123)

PROFESSORS BERTON (Chairman), STRIGHT: ASSOCIATE PROFESSORS K. KUHNS, LHAMON, PILLAI: ASSISTANT PROFESSORS BRINK, CARPENTER, DALY, EVANS, REPSYS, C. ROIDER, WALKER, WONG: LECTURER McLEAN.

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

In general, the sequence 100-172-173 is designed for prospective elementary school teachers; the sequences 100-142-143-147-148 and 100-147-148-142-143 are designed for prospective social and life scientists, and the calculus sequence 161-162-163-261-262-263-264 is designed for prospective engineers, mathematicians and physical scientists.

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

Students majoring in mathematics must complete 45 credit hours in mathematics. They must
complete Mathematics 264 and then complete at least 25 credit hours in mathematics courses at the 300/400 level including 311, 321, and 361. Physics 231-232-233 are also required as part of the mathematics major. All mathematics courses to be counted toward the major must have been completed with a grade of C or better. A senior comprehensive examination is required. All mathematics majors are encouraged to take Digital Computer 101 in the College of Engineering early in their program.

000. ORIENTATION. Familiarization with the department, requirements for majors, planning programs of courses, university catalog and library. Required of departmental majors. 1 hour.

100. MATHEMATICS. Mathematical logic, set theory, the essence of a proof, permutations and combinations. 3 hours.

142. PROBABILITY AND STATISTICS 1. Set operations, permutations and combinations, sample-space, random variable, and probability, sample and population averages, frequency distribution and probability functions, binomial and normal distribution. Prerequisite: Mathematics 100, or 162 or its equivalent in high school work. 3 hours.

143. PROBABILITY AND STATISTICS 2. Sampling distributions, estimation, testing hypothesis, regression and correlation. Prerequisite: Mathematics 142. 3 hours.

147. INTRODUCTORY CALCULUS 1. Equations of lines, functions and graphs, slope, derivative, velocity, limits, derivatives of algebraic functions, continuity, increasing and decreasing functions, related rates, curve sketching. Prerequisite: Mathematics 100 or 161 or its equivalent in high school work. 3 hours.

148. INTRODUCTORY CALCULUS 2. The indefinite integral, applications, area, fundamental theorem of calculus, definite integral, applications, approximation, average value of a function, derivatives and integrals of logarithmic and exponential functions, integration by parts, elementary differential equations. Prerequisite: Mathematics 147. 3 hours.

161. ELEMENTARY FUNCTIONS 1. The real number system, algebraic expressions, equations and inequalities, functions and graphs, exponential and logarithmic functions. 3 hours.

162. ELEMENTARY FUNCTIONS 2. Trigonometric functions, trigonometric identities and formulas, solutions of triangles, systems of equations and inequalities, complex numbers, polynomials and their zeroes, sequences. Prerequisite: Mathematics 161 or its equivalent in high school work. 3 hours.

163. ANALYTIC GEOMETRY. Rate of change of a function, slope of a curve, limits, derivatives of algebraic functions, chain rule, continuity, related rates, curve plotting, maxima and minima, mean value theorem, indefinite integral, fundamental theorem, applications of integration. Prerequisite: Mathematics 162 or its equivalent in high school work. 5 hours.

172. FUNDAMENTAL MATHEMATICS 1. Theory of arithmetic, systems of numeration, relations, algorithms, whole numbers, integers, rational numbers, real numbers, patterns of proof. Prerequisite: Mathematics 100. 3 hours.

173. FUNDAMENTAL MATHEMATICS 2. Geometric figures, tranformations on the plane, congruences of geometric figures, symmetry, similarity. Prerequisite: Mathematics 100. 3 hours.
245. HISTORY OF MATHEMATICS. An introduction to the history and origin of mathematics, restricted principally to mathematics through elementary calculus, a chronological study of some mathematicians and their contributions to mathematical thought. Prerequisite: Mathematics 264. (to be offered on alternate years 1973-74). 3 hours.

261. CALCULUS 1. Applications of integration, calculus of transcendental functions, differential equation of natural growth, techniques of integration, integration by parts, numerical approximations of definite integrals, plane analytic geometry, polar coordinates. Prerequisite: Mathematics 163. 4 hours.

262. CALCULUS 2. Vectors and parametric equations, scalar and vector products, loci in space, determinants, simultaneous linear equations, matrices, linear independence, linear transformations, tangential vectors, curvature, polar and cylindrical coordinates. Prerequisite: Mathematics 261. 4 hours.

263. CALCULUS 3. Convergence of series of constants, power series expansion, Taylor's theorem, indeterminate forms, Fourier series, directional derivative, gradient, chain rule for partial derivatives, higher order derivatives, extrema of functions of several independent variables, exact differentials. Prerequisite: Mathematics 262. 4 hours.

264. CALCULUS 4. Double and triple integrals and applications, polar, cylindrical, and spherical coordinates, surface and line integrals, Green's divergence, and Stokes theorems, first order differential equations. Prerequisite: Mathematics 263. 4 hours.

291-292-293. CALCULUS THEORY SEMINAR 1, 2, 3. A theoretical treatment of the calculus to be taken concurrently with 263, 264 and 361. Including continuity, uniform continuity, convergence and uniform convergence. Prerequisite: Mathematics 261. 3 hours.

311, 312, 313. ABSTRACT ALGEBRA. Rings, integral domains, fields, real and complex numbers, groups, polynomials, ideals, vector spaces, systems of linear equations, determinants, linear transformations, and matrices. (To be offered on alternate years 1974-75). Prerequisite: Mathematics 264. 3 hours.

321. INTRODUCTION TO TOPOLOGY AND ANALYSIS. Set theory, composition, inverses, restriction and extension of functions, metric spaces, continuity, open and closed sets, limits, products, subspaces, and equivalence of metric spaces. (to be offered on alternate years 1973-74). Prerequisite: Mathematics 264. 3 hours.

361. DIFFERENTIAL EQUATIONS. Applications of first order equations, second order linear differential equations with applications, Laplace transforms, systems of first order equations. Prerequisite: Mathematics 264. 4 hours.

362. PARTIAL DIFFERENTIAL EQUATIONS. Fourier series, partial differential equations, Bessel functions, Legendre polynomials, non-linear differential equations. (To be offered on alternate years 1974-75. Prerequisite: Mathematics 361. 4 hours.

363. COMPLEX VARIABLES. Complex algebra, complex calculus, analytic functions, infinite series over the complex plane, theory of residues, conformal mapping. (To be offered on alternate years 1974-75.) Prerequisite: Mathematics 264. 4 hours.
381-382. STATISTICS 1 AND 2. Probability models, random variables, sampling estimation, testing hypothesis, non-parametric procedures, regression and correlation. Prerequisite: Mathematics 264. 6 hours.

421-422. FOUNDATIONS OF GEOMETRY 1 AND 2. Incidence, ordering, separation and congruence, as they are involved in non-Euclidean, incidence, affine and Euclidean geometrics. (To be offered on alternate years, 1973-74). Prerequisite: Mathematics 264. 6 hours.

423. PROJECTIVE GEOMETRY. Projectivities, perspectivities, perspective triangles, quadrangular sets, harmonic sets, duality, fundamental theorem and Pappus' Theorem, polarities, the conic, finite projective plane, parallelism, coordinates. (To be offered on alternate years 1973-74). Prerequisite: Mathematics 264. 3 hours.

452-453. REAL ANALYSIS 1 AND 2. Elements of point set theory, limits, sequences, continuity, partial differentiation, implicit functions, Riemann integrals including improper integrals, convergence and uniform convergence of infinite series. (To be offered on alternate years, 1973-74). Prerequisite: Mathematics 361. 6 hours.

461-462. NUMERICAL ANALYSIS 1 AND 2. Review of Fortran, linear systems of equations, approximations, finite differences, differential equations, eigenvalue problems, numerical solutions of equations, linear programming. (To be offered on alternate years, 1974-75). Prerequisite: Mathematics 361. 6 hours.

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

494. SEMINAR IN MATHEMATICS. 1-3 hours.

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

MUSIC
(Department 152)

PROFESSORS DRAKE (Chairman), LINGER, ROIDER; ASSISTANT PROFESSORS DOUDNA, FORSYTHE, MILLER, SONNTAG; INSTRUCTOR LAUTENBACH; LECTURERS DARST, LAUKHUF, SHERRICK, YOUNG.

The Department of Music serves a two-fold function. It serves the general university community and students through its general and in-depth course offerings, its performing groups which are open to all students, and through its many concerts, recitals, and other performances which enhance the cultural life and atmosphere of the university. In addition to this service function, the department offers a full course of music and music education studies for the aspiring music educator or professional performer.

The music major is given a variety of courses and experiences to help him gain the knowledge and proficiency in breadth and depth which will help him achieve future success in his chosen area of endeavor in the music field. Special topics and studies may be undertaken to enrich the basic course offerings, especially for the music major who is not taking teacher certification. Some of these special areas of concentration are applied performance, church music, music history and literature, theory and composition.

The basic courses required of all music majors are Music 100, 121, 122, 123, 221, 222, 223, 321, 322, 323, 421, 422. Applied instruction and performing groups are taken in addition each
quarter. Regular student recital performances and participation in performing group concerts provide continual growth in performance skills and musicianship. A Senior Comprehensive Exam is not required.

The music major electing to earn a teaching certificate is required to take the basic music education courses 334, 336, 338, 339, 361, 362, 363, and 461 or 462-3 in addition to the professional education courses.

**BACHELOR OF ARTS DEGREE, MUSIC MAJOR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Major performance area (individual instruction)</td>
<td>24 hours</td>
</tr>
<tr>
<td>Theory of Music (Basic and Advanced Theory)</td>
<td>24 hours</td>
</tr>
<tr>
<td>Music History and Literature</td>
<td>9 hours</td>
</tr>
<tr>
<td>Conducting</td>
<td>4 hours</td>
</tr>
<tr>
<td>*Major performing group (each quarter)</td>
<td></td>
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<tr>
<td><strong>Piano proficiency</strong></td>
<td></td>
</tr>
<tr>
<td>*<strong>Senior Recital</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61 hours</strong></td>
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Note: Music 100 is also required, but is included in the general education units.

Note: Instead of taking 24 hours in one major performance area, a student may choose two alternatives. He may major in two applied areas with 18 hours of study in each area, or he may take 18 hours in a designated major applied area and 12 hours in a minor applied area. The hours must be spread throughout the student’s college years. The senior recital will include both applied areas.

**ADDITIONAL COURSES FOR TEACHER CERTIFICATION IN MUSIC, VOCAL AND INSTRUMENTAL, GRADES 1-12**

- Professional Education (as described in the Teacher Education part of the catalog) including Education 223, 224, 370, 380, and 15 hours of student teaching. **27 hours**
- Music Education including elementary and secondary music methods (9 hours), instrumental methods (8 hours), class voice (3 hours), and class piano (3 hours). **23 hours**
- Total additional for certification **50 hours**

* All music majors must participate in a major performing group each quarter they are enrolled for 12 or more hours. They may be excused from this requirement only when an unavoidable conflict arises in their student teaching schedule. Vocal majors must participate in Chorus or Singers. Instrumental majors must participate in Concert Band (or Orchestra if a string major who does not play a wind or percussion instrument). Keyboard majors must participate in Band or Chorus. No credit for the major group participation may be used to satisfy basic music major credit hour requirements toward the degree. However, a minimum of six hours credit for various performing groups must appear on transcript for teacher certification.

** A piano proficiency examination must be passed by all music majors. Students may audit piano or take it for credit; however, three hours must be taken for credit to satisfy certification requirements.

*** A senior recital near the end of the applied major instruction will climax the effort in this area. The recital may be full length or may be in combination with other senior recitalists. The program will reflect the student’s ability to perform music in a variety of period styles.
Note: Education 100 and Psychology 100 are also required, but are included in the general education courses. A slightly reduced program for high school certification only can be arranged.

APPLIED MUSIC

Each music major generally takes two credit hours of individual instruction in his major applied area each quarter. Non-music majors and music majors studying minor applied areas usually register for one credit hour of class or individual instruction each quarter. Non-music majors are assessed an extra fee only for individual lessons, and the availability of these lessons is dependent upon the schedule and load of the instructor involved.

10. Voice
   —Class
15. Voice
   —Individual
20. Piano
   —Class
25. Piano
   —Individual
30. Organ
   —Class
35. Organ
   —Individual
40. Strings
   —Class
45. Strings
   —Individual
50. Woodwinds
   —Class
55. Woodwinds
   —Individual
60. brasses
   —Class
65. brasses
   —Individual
70. Percussion
   —Class
75. Percussion
   —Individual

Note: 1) All class instruction carries one hour credit per quarter. The amount of instruction depends upon the size of the class, but is no less than one-half nor more than two class hours per week.

2) Individual instruction is offered for varying hours of credit. The section number will determine the number of hours credit. Usually, two hours for majors and one hour for minors are taken. Generally, one half hour weekly of individual instruction is given for each hour of credit taken.

MUSIC PERFORMING GROUPS

Membership in performing groups is open to all university students, and they are encouraged to participate. A maximum of six hours of credits is allowed non-music majors
toward basic graduation requirements, but students may enroll every year until graduation. In-depth requirements in Fine Arts may be satisfied by two to four years membership in a major performing group.

80. CHORUS. All qualified students are given the opportunity to sing in the University Chorus. Music of all types, accompanied and a cappella, is studied and performed throughout the year in concerts and performances on and off campus. 1 hour per quarter.

81. CHAPEL CHOIR. A choral group open to all students for the study and performance of religious music. The Chapel Choir rehearses once weekly and sings at all chapel services. 1 hour per quarter.

83. UNIVERSITY SINGERS. A select group of men and women singers designed to perform a wide variety of choral literature with the highest musical standards. Performances include concerts and programs on and off campus. Membership by audition only. 1 hour per quarter.

84. CONCERT BAND. All qualified students who play band instruments are given the opportunity to play in the University Concert Band. The finest band literature of all types is studied and performed in regular campus concerts and tours. 1 hour per quarter.

86. PEP BAND. A band specially organized to provide music for athletic events. Members must be enrolled in Concert Band. 1 hour per quarter.

88. JAZZ LAB BAND. A selected ensemble for the study and performance of modern characteristic literature for the medium. Performances on and off campus are scheduled throughout the year. Members are expected to be enrolled in Concert Band. 1 hour per quarter.

90. MEN’S GLEE CLUB. A vocal ensemble for men in the collegiate tradition. The Men’s Glee Club appears regularly in concert and at other university and off-campus functions. 1 hour per quarter.

91. WOMEN’S GLEE CLUB. A vocal ensemble for women for the study and performance of characteristic literature. The Women’s Glee Club performs at various concerts and functions on and off campus. 1 hour per quarter.

92. WOODWIND ENSEMBLE. Selected ensembles of woodwind instrumentalists for the study and performance of characteristic literature. 1 hour per quarter.

94. BRASS ENSEMBLE. Selected ensembles of brass and percussion instrumentalists for the study and performance of characteristic literature. 1 hour per quarter.

96. ORCHESTRA. Membership in the Lima Symphony Orchestra is available to qualified students who perform orchestral instruments. Audition is required. 1 hour per quarter.

98. STRING ENSEMBLE. Ensembles of string instrumentalists for the study and performance of characteristic literature. 1 hour per quarter.

**COURSES IN MUSIC**

000. ORIENTATION. Familiarization with the department, requirements for majors, planning programs of courses, university catalog and library. Required of departmental majors. 1 hour.
100. MUSIC. A basic course in the nature, forms, styles, and media of music of all types and periods. Emphasis upon listening and understanding. Laboratory listening and concert attendance, knowledge of fundamentals, recognition of composers and representative literature expected. 3 hours.

112. MUSIC FOR THE CLASSROOM TEACHER. Music activities, materials, and literature, unit planning, teaching methods and skills for the classroom teacher—grades K-6. Prerequisite: Music 100. 3 hours.

121-122-123. THEORY OF MUSIC. Basic music theory and harmony. Scales, intervals, chords, ear training, sight-singing, part-writing, functional music, creative projects in composition and arranging. Required of all freshmen music majors. Must be taken in sequence. 4 hours per quarter.

221-222-223. ADVANCED THEORY OF MUSIC. Counterpoint, form and analysis, contemporary theory, harmonic dictation, orchestration, arranging, creative projects in composition. Must be taken in sequence. Prerequisite: Music 123. 4 hours per quarter.

261. LATIN AND ITALIAN DICTION FOR SINGERS. A course designed to acquaint vocalists with the proper pronunciation of vocal and choral texts in Latin and Italian. Required of all vocal music majors. 1 hour.

262. FRENCH DICTION FOR SINGERS. Continuation of 261 in French. 1 hour.

263. GERMAN DICTION FOR SINGERS. Continuation of 261-262 in German. 1 hour.

321-322-323. MUSIC HISTORY AND LITERATURE. The historical development of music literature. Study of representative literature and composers: Ancient, Medieval, Renaissance, Baroque, Classical, Romantic, and Twentieth Century periods. Prerequisite: Music 100. 3 hours per quarter.

334. WOODWIND METHODS. Study, elementary performance skills, pedagogy, and material of the woodwind instruments. Designed for the future public school music teacher. 2 hours.

336. BRASS METHODS. Study, elementary performance skills, pedagogy, and materials of the brass instruments. 2 hours.

338. PERCUSSION METHODS. Study, elementary performance skills, pedagogy, and materials of the percussion instruments. 2 hours.

339. STRING METHODS. Study, elementary performance skills, pedagogy, and materials of the orchestral stringed instruments. 2 hours.

361. ELEMENTARY MUSIC METHODS. (Music Education Majors). Philosophy, techniques, materials, curriculum planning for the elementary music teacher and supervisor. 2 hours.

362. SECONDARY MUSIC METHODS. (Music Education Majors). Philosophy, techniques, materials, curriculum planning for the secondary music program—general, vocal, and instrumental. 2 hours.
363. ORGANIZATION AND SUPERVISION OF SCHOOL MUSIC PROGRAMS. Organization-
al techniques for the music performing group director. Library, personnel, equipment, office-
files and procedure, facility planning, publicity and public relations, and other practical topics. 2 hours.

371-372-373. APPLIED FIELD LITERATURE. Study of the professional and educational liter-
ature in a specific applied field. Piano literature will be offered in 1973-74. One hour per quarter.

421-422. CONDUCTING I, II. General conducting techniques and principles of score study 
of choral, band, and orchestral literature. Rehearsal techniques and application of technique 
and score study to representative literature. Must be taken in sequence. Prerequisite: Music 
223. 2 hours per quarter.

461. CONCERT CHORAL METHODS AND TECHNIQUES. Procedures in the development 
and direction of school choral groups, including choral literature of all types. 3 hours.

462. CONCERT INSTRUMENTAL METHODS AND TECHNIQUES. Procedures in the develop-
ment and direction of school bands and orchestras, including band literature of all types. 2 
hours.

463. MARCHING BAND METHODS AND TECHNIQUES. Methods, materials, and techniques 
in the development and direction of the marching band. Show planning, precision drill, 
rehearsal techniques, and selection and rehearsal of music. Laboratory experiences. 1 hour.

480. SENIOR RECITAL. 0 hours.

490. SPECIAL TOPICS IN MUSIC. Group study of approved specialized topics not offered in 
catalog. 1-3 hours.

494. SEMINAR IN MUSIC. 1-3 hours.

497. INDEPENDENT STUDY IN MUSIC. A wide variety of specialized musical subjects are 
available through individual study with a faculty member. 1-3 hours.

PHILOSOPHY AND RELIGION
(Department 115)

PROFESSORS HINDERLITER (Chairman), TINSLER; ASSOCIATE PROFESSOR 
WHIPPLE; ASSISTANT PROFESSORS BECKER, BENSON.

MAJOR PROGRAMS

PHILOSOPHY

The major in philosophy requires a minimum of 45 quarter hours beyond Philosophy 100, 
and must include either Seminar 494 or Independent Study 497. A maximum of three courses 
in religion may be applied to the philosophy major. A senior comprehensive exam is not 
required.
RELIGION

The major in religion requires a minimum of 45 quarter hours beyond Religion 105, and must include either Seminar 495 or Independent Study 498. A maximum of three courses in philosophy may be applied towards the religion major. A senior comprehensive exam is not required.

PHILOSOPHY AND RELIGION

The major in philosophy and religion requires a minimum of 45 quarter hours beyond Philosophy 100 and Religion 105, with the selection of courses subject to approval by the Department. A senior comprehensive exam is not required.

It is recommended that majors in the Department who plan to attend theological seminary or graduate school take two years of foreign language.

PHILOSOPHY

Philosophy is a quest for a comprehensive understanding of human existence. Philosophical activity endeavors to examine the rational justification for logical inferences, human values, criteria for establishing the claims of knowledge and certainty, and interpretations of the nature of reality. The diverse insights of significant philosophers from ancient times to the present contribute resources to stimulate contemporary philosophical thinking in each of these areas.

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Also listed as Religion 000. Required of departmental majors. 1 hour.

100. PHILOSOPHY. An introduction to philosophical inquiry, its scope and methodology, through a study of representative philosophical problems such as the nature of ethical values, principles of correct reasoning, the possibility and limits of knowledge, and the distinction between appearance and reality. 3 hours.

Most of the following courses are offered in alternate years or on demand.

234. LOGIC. A consideration of the role of language in reasoning. An understanding of formal logical methods and their application in the analysis of deductive arguments. 3 hours.

237. KNOWLEDGE AND TRUTH. An examination of the scope and justification of knowledge with reference to problems such as skepticism, sense perception, reason, belief, and truth. 3 hours.

238. PHILOSOPHICAL ETHICS. The meaning of ethical statements and criteria by means of which ethical claims are justified rationally, including a critical examination of ethical theories through the study of selected philosophical essays. 3 hours.

241. AESTHETICS. The theories relating to the creation, appreciation and critical evaluation of the various fine arts, and of the various theories of beauty and the related aesthetic experience. 3 hours.
245. EXISTENTIALISM. The historical roots of existentialism in Kierkegaard and Nietzsche and the thought of Heidegger, Sartre, and other representative figures. 3 hours.

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

294. SEMINAR IN PHILOSOPHY. 1-3 hours.

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

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

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

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

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

444. AMERICAN PHILOSOPHY I. The development of philosophy in early America through a study of representative thinkers of Puritan idealism, the American enlightenment and transcendentalism. 3 hours.

445. AMERICAN PHILOSOPHY II. Main currents in modern American philosophy expressed through the writings of Peirce, James, Royce, Santayana and Dewey. 3 hours.

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

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

494. SEMINAR IN PHILOSOPHY. 1-3 hours.

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

RELIGION

Religion is an integral part of human life and culture. It includes the ultimate commitments, attitudes, beliefs and forms of worship by which men live and find meaning for their personal and social existence. The courses in religion are intended to acquaint the student with the living religious traditions, primarily of the West, through an examination of their origins and development, their interaction with the changing cultural context, and their insights for dealing with the perennial questions of man's existence and destiny. The approach to the study is ecumenical and makes use of current scholarly methods of research and findings.
000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Also listed as Philosophy 000. Required of departmental majors. 1 hour.

105. RELIGION. A non-sectarian study of religion, and its nature and function in the modern Western world. Illustrations of basic concepts and principles of religion are taken mainly from Judaism and Christianity, the chief religions of our western culture. 3 hours.

Most of the following courses are offered in alternate years or on demand.

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

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

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

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

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

263. CHRISTIAN ETHICS. The relation of biblical and theological thought to the development of ethical principles. Application to personal and social moral issues, such as marriage, family, race, politico-economic life, international affairs. 3 hours.

267. ASIAN RELIGIONS. The major living religions of the Orient. 3 hours.

291. SPECIAL TOPICS IN RELIGION. 1-3 hours.

295. SEMINAR IN RELIGION. 1-3 hours.

352. CHRISTIAN LIFE AND THOUGHT I. Christianity from the time following the New Testament period to the eve of the Reformation with emphasis upon the development of the Christian faith and the conflict between church and state. 3 hours.

353. CHRISTIAN LIFE AND THOUGHT II. The Protestant-Catholic conflict and the impact of modern secular thought on Christianity from the Reformation through the Nineteenth Century. 3 hours.

361. CONTEMPORARY CHRISTIAN THOUGHT. Basic issues, major theological positions, and representative theologians of twentieth century Christian thought. 3 hours.

PHILOSOPHY OF RELIGION. 3 hours. (See Philosophy 452)
461. LIFE AND TEACHINGS OF JESUS. An approach to the understanding of Jesus through Matthew, Mark and Luke with contemporary theories about the Gospels. 3 hours.

463. LIFE AND TEACHINGS OF ST. PAUL. The insights of the most influential thinker and apostle in the early church. 3 hours.

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

495. SEMINAR IN RELIGION. 1-3 hours.

498. INDEPENDENT STUDY IN RELIGION. 1-3 hours.

PHYSICS
(Department 124)

PROFESSOR ABELE; ASSOCIATE PROFESSORS GANGEMI (Chairman), MESSICK (on leave), WEIMER (on leave); ASSISTANT PROFESSORS GLENN, GUBERNATIS, ROLL.

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

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

The physics major must complete 57 hours in his major field, should follow the sequence and obtain the prerequisites for the advanced courses as determined by the department. Physics majors in education must complete 45 hours in their major field. A Senior Comprehensive Exam is not required.

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

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Required of departmental majors. 1 hour.

100. PHYSICS. Intended for Liberal Arts students. This course presents the basic laws and principles which govern the behavior of nature with special emphasis on Mechanics, and Atomic and Nuclear structure. The interaction of physics with other areas of culture will also be considered. 3 hours.

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

Physics 211, 212, and 213 are the non-calculus, general physics courses intended primarily for pre-pharmacy and secondary education students. Prerequisite: Mathematics 161, 162 or equivalent.

211. GENERAL PHYSICS: MECHANICS OF SOLIDS AND FLUIDS. 4 credit hours. (3 + 2) Physics 224 Laboratory must be taken concurrently.
212. GENERAL PHYSICS: SOUND, HEAT AND LIGHT. 4 credit hours. (3+2) Physics 225 Laboratory must be taken concurrently.

213. GENERAL PHYSICS: ELECTRICITY AND MAGNETISM. 4 credit hours. (3+2) Physics 226 Laboratory must be taken concurrently.

Physics 231, 232 and 233 are the calculus general physics courses designed for physics and engineering students. Physics 231 should precede 232 and 233. Prerequisite: Calculus 261 which may be taken concurrently or equivalent.

231. PHYSICS: MECHANICS OF SOLID AND FLUIDS. 5 credit hours. (4+2) Physics 224 Laboratory must be taken concurrently.

232. PHYSICS: SOUND, HEAT AND LIGHT. 5 credit hours. (4+2) Physics 224 Laboratory must be taken concurrently.

233. PHYSICS: ELECTRICITY AND MAGNETISM. 5 credit hours. (4+2) Physics 226 Laboratory must be taken concurrently.

250. ASTRONOMY I. The evolution of man's understanding of the structure and extent of the solar system. A review of current knowledge of the solar system, and an introduction to stellar systems. 3 hours.

251. ASTRONOMY II. The structure and evolution of stars and stellar systems. Cosmology. Prerequisite: Astronomy 250. 3 hours.

303. MODERN PHYSICS. The concepts of relativity, quantum and wave mechanics, atomic structure and absorption and emission processes. Prerequisites: Calculus 264 and Physics 233. 3 hours.

310. THEORY AND ADVANCED LABORATORY: MECHANICS. 1-3 hours.

320. THEORY AND ADVANCED LABORATORY: LIGHT, HEAT, SOUND. 1-3 hours.

330. THEORY AND ADVANCED LABORATORY: ELECTRICITY. 1-3 hours.

340. THEORY AND ADVANCED LAB: NUCLEAR PHYSICS AND SOLID STATE. 1-3 hours. Credit is given in courses 310, 320, 330 and 340 according to the work done. Offered every quarter. Prerequisite: Physics one year.

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

352. ANALYTICAL MECHANICS II. Lagrange equations, canonical formulation, principle of least action, normal coordinates, rigid bodies, special relativity, mathematical methods. Prerequisites: Mathematics 352 or 362 and Physics 351. 3 hours.

353. NUCLEAR PHYSICS. Nuclear radiation detection instruments, nuclear constituents and structure, nuclear models, nuclear reactions, fundamentals of nuclear reactor theory and design, shielding and safety principles in nuclear physics. Prerequisite: Physics 231, 232, 233.
361. ELECTRONICS. Electron ballistics, vacuum tubes, rectifiers, amplifiers, oscillators, modulators, electron tube instruments. Prerequisite: Physics 213 or 233. 3 hours.

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

411. ELECTRICITY AND MAGNETISM I. Electrostatic field theory, capacitance, multipole expansion, dielectric properties of matter; magnetic field theory; electromagnetic induction; magnetic properties of matter; Maxwell's equations and electromagnetic waves. Prerequisites: Mathematics 264 and Physics 233. 3 hours.

412. ELECTRICITY AND MAGNETISM II. Advanced electric and magnetic fields, electric and magnetic properties of solids, electromagnetic radiation. Prerequisites: Mathematics 362 and Physics 411. 3 hours.

413. SOLID STATE. A lecture and problems course in the structure of solids and their phenomena. Quantum and statistical mechanics concepts are introduced to develop theories of internal stress and strain in crystals, conductivity of electricity in metals, semiconductors and superconductors, magnetism, the thermal properties of solids and imperfections in solids. Prerequisite: Physics 303. 3 hours.


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

463. PHYSICAL OPTICS. The law of Physical Optics, interference, diffraction and polarization and instrumentation. Prerequisite: Physics 363. 3 hours.

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

494. SEMINAR IN PHYSICS. 1-3 hours.

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

PSYCHOLOGY, SOCIOLOGY, AND SOCIAL WORK
(Department 133)

ASSOCIATE PROFESSORS COHOE, HUNT (Chairman); ASSISTANT PROFESSORS GATES (leave of absence), OCCHETTI, VIVINO; INSTRUCTORS COMPTON, OBER, PECK; LECTURER DAPORE.

The objectives of this department are to develop within each student an understanding of human relationships, institutions, and social processes; familiarize him with the nature and causes of social problems; acquaint him with the theories of behavior; enable him to think more critically and to integrate his insights for useful participation in community life; and prepare him for advanced study in his respective field.
A major in psychology includes the successful completion of forty-six hours in psychology in addition to Psychology 100. The following courses are required: Psychology 000, 110, 112, 250, 311, 319, 333, 420, 421, 431, 494; Biology 100, 112, 113; Mathematics 100, 142, 143. A Senior Comprehensive Examination is not required.

A major in sociology includes the successful completion of forty-six hours in sociology in addition to Sociology 105. The following courses are required: Sociology 000, 205 or 206, 250, 305, 306, 319, 351, 418, 495; Anthropology 330, 331; Mathematics 100, 142, 143; Engineering (Digital Computer) 101. A Senior Comprehensive Examination is not required.

A major in social work includes the successful completion of the following courses: Social Work 000, 241, 342, 343, 441, 442, 443, 444; Biology 100, 112, 113; Mathematics 100, 142; Political Science 105; Psychology 100, 215, 311; Sociology 105, 204, 205, 305, 306, 323, 403. A Senior Comprehensive Examination is not required.

Secondary Teacher Certification programs are offered in social psychology, sociology, and comprehensive social studies.

**PSYCHOLOGY**

000. ORIENTATION. Familiarization with the department requirements for majors, planning program of courses, university catalog and library. Also listed as Psychology 000 and Sociology 000. Required of departmental majors. 1 hour.

100. PSYCHOLOGY. General research and concepts in human behavior. Lectures, demonstrations, observations and experiments. 4 hours.

110. GENERAL PSYCHOLOGY I. Scientific study of behavior with an emphasis on physiological processes, sensation, and perception. Also included are laboratory exercises which stress research methodology. Prerequisite: Psychology 100. 4 hours.

112. GENERAL PSYCHOLOGY II. Scientific study of behavior with an emphasis on arousal, emotion and motivation. Also included are laboratory exercises which stress research methodology. Prerequisite: Psychology 110. 4 hours.

215. DEVELOPMENTAL PSYCHOLOGY. Basic theories in human development from conception through old age; contemporary research at each age level. Prerequisite: Psychology 100. 3 hours.

250. SOCIAL STATISTICS. Analysis of variance, nonparametric methods, and hypothesis testing in the Social Sciences. Also listed as Sociology 250. Prerequisite: Mathematics 143. 3 hours.

265. PSYCHOLOGICAL ASSESSMENT. The study of psychological measurement and evaluation in the areas of intelligence tests, tests of separate abilities, and personality inventories. Experience will be gained in test administration, scoring, and interpretation. Prerequisite: Psychology 100. 4 hours.

311. PSYCHOLOGY OF PERSONALITY. The major theories of personality from Freud to contemporary theoretical approaches. Prerequisite: Psychology 100. 4 hours. (Offered 3 hours, 1973-74, Riverside campus.)
319. METHODS IN SOCIAL RESEARCH. Review and practice of major methodological techniques in social research through critical analysis of selected professional monographs and/or articles; construction and analysis of questionnaires; interpretation and presentation of data; use of the computer in social research. Also listed as Sociology 319. Prerequisite: Psychology 250. 3 hours.

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

351. SOCIAL PSYCHOLOGY. The effect of social and cultural forces upon the individual. The nature and development of attitudes, languages, cognitive processes. Individual and group projects illustrative of the methodology of Social Psychology. Also listed as Sociology 351. Prerequisite: Psychology 100 or Sociology 105. 4 hours.

353. PSYCHOLOGY OF BUSINESS AND INDUSTRY. Psychology as used in business, industry, and personnel work. Prerequisite: Psychology 100. 3 hours.

411. COUNSELING PSYCHOLOGY. The basic psychological principles involved in the counseling situation; techniques of interviewing. Prerequisite: Psychology 100. Open to seniors. 3 hours.

420. ABNORMAL PSYCHOLOGY I. A review of the historical background of the development of modern approaches to abnormal behavior; a study of the psychological, biological, and sociological factors in the development of abnormal behavior; the diagnosis and treatment of transient situational reactions, neuroses, psychophysiological reactions, and mental deficiencies. Prerequisite: Psychology 100. 3 hours.

421. ABNORMAL PSYCHOLOGY II. A review of the causes, diagnoses, and treatment of sociopathic reactions, sexual deviant reactions, personality pattern and trait disorders, functional and organic psychoses; a survey of diagnostic procedures and therapeutic approaches used in clinical psychology. Prerequisite: Psychology 100. 3 hours.

423. PSYCHOLOGY OF THE EXCEPTIONAL CHILD. The classification of the non-typical child; the use of the school and other sources for meeting his needs. Prerequisite: Psychology 100. 3 hours.

425. PSYCHOLOGICAL FACTORS IN DRIVING. A study of behavior with emphasis on attitudes, motivation, and adjustment and their relationship to unsafe driving. Investigation of principles and methods appropriate in identifying, understanding, and modifying unsatisfactory driving behavior. Prerequisite: Psychology 100. Offered in summer. 3 hours.

431. EXPERIMENTAL PSYCHOLOGY. Methods of experimental psychology; report writing, terminology, and relevant background materials. Prerequisite: Psychology 319. 4 hours.

434. HISTORICAL STUDY OF PSYCHOLOGY. Lines of thought influencing the field of psychology; Greek and European antecedents of major issues up to the 20th century. Prerequisite: Psychology 100. 3 hours.
435. SYSTEMS OF PSYCHOLOGY. Early systems of psychological thought and theoretical views of the 20th century. Prerequisite: Psychology 100. 3 hours.

436. READINGS IN PSYCHOLOGICAL RESEARCH. Current research and theory in psychological literature. 3 hours.

437. PRACTICUM IN PSYCHOLOGY. Work with patients in a clinical setting under supervision; practical experience in interviewing and administering routine psychological tests. May be repeated once. Approval of instructor. 3 hours.

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

494. SEMINAR IN PSYCHOLOGY. Open to seniors. 3 hours.

497. INDEPENDENT STUDY IN PSYCHOLOGY. Approval of chairman. 1-3 hours.

SOCIOLOGY

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Also listed as Psychology 000 and Social Work 000. Required of departmental majors. 1 hour.

105. SOCIOLOGY. Basic sociological concepts most needed for understanding and analyzing modern social structure and the process of social change. 4 hours.

204. MARRIAGE AND THE FAMILY. An institutional perspective on the family; patterns of courting, marital and parental behavior; trends in the contemporary American family. Prerequisite: Sociology 105 or Psychology 100. 3 hours.

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

206. AMERICAN SOCIETY. Sociological analysis of contemporary American society; the structure of American social life, the major institutions of American society, and the sources of social change in American society. Prerequisite: Sociology 105. 3 hours.

250. SOCIAL STATISTICS. Analysis of variance, nonparametric methods, and hypothesis testing in the Social Sciences. Also listed as Psychology 250. Prerequisite: Mathematics 143. 3 hours.

305. SOCIAL DEVIANCE. Sociological perspectives on the processes of individual and group deviance: a discussion of selected major problems of deviance in industrial societies, their social causes, consequences, and solutions. Prerequisite: Sociology 205 or 206. 3 hours.

306. SOCIAL CHANGE. A structural analysis of the problems of complex societies; the systematic strains and inconsistencies which generate societal problems; consideration of measurement of social change. Prerequisite: Sociology 305. 3 hours.

307. POPULATION ANALYSIS. Size, composition, distribution and growth of human populations; theories of population growth and migration; problems in social policy in overpopulation and economic development. Prerequisite: Sociology 105. 3 hours.
319. METHODS IN SOCIAL RESEARCH. Review and practice of major methodological techniques in social research through critical analysis of selected professional monographs and/or articles; construction and analysis of questionnaires; interpretation and presentation of data; use of the computer in social research. Also listed as Psychology 319. Prerequisite: Sociology 250. 3 hours.

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

323. JUVENILE DELINQUENCY. Analysis of theories of delinquency and their application to development, treatment, prevention, and control. Prerequisite: Sociology 105. 3 hours.

351. SOCIAL PSYCHOLOGY. The effect of social and cultural forces upon the individual. The nature and development of attitudes, language, and cognitive processes. Individual and group projects illustrative of the methodology of Social Psychology. Also listed as Psychology 351. Prerequisite: Sociology 105 or Psychology 100. 4 hours.

403. SOCIOLOGY OF MINORITIES. The analysis of the sociological aspects of dominant-minority relationships. Prerequisite: Sociology 105. 3 hours.

405. SOCIOLOGY OF RELIGION. The major contributions of social scientists to the study of religious institutions; the various forms and social functions of religion, the structure of religious behavior and organization; the relations between religion and other social institutions. Prerequisite: Sociology 105 or Psychology 100. 3 hours.

414. URBAN SOCIOLOGY. A comparative study of the organization, social processes, problems, and interrelationships of rural and urban communities. Prerequisite: Sociology 105. 3 hours.

415. MASS COMMUNICATIONS. The social structure of mass communications and its audiences; the social consequences of the media employed; content analysis; the effect of mass communications on its audience. Prerequisite: Sociology 105 or Psychology 100. 3 hours.

416. COLLECTIVE BEHAVIOR. Theory and research in the sociological study of crowds, publics, social movements and revolutions; the study of the origins, development and structure on noninstitutionalized social behavior and of social attempts to accomplish social change. Prerequisite: Sociology 105 or Psychology 100. 3 hours.

418. HISTORY OF SOCIAL THEORY. The development of sociological theory from Comte to the present, with emphasis upon 20th century American theory representing changing research interests and goals. Prerequisite: Sociology 319. 3 hours.

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

495. SEMINAR IN SOCIOLOGY. Open to seniors. 3 hours.

498. INDEPENDENT STUDY IN SOCIOLOGY. Approval of chairman. 1-3 hours.
SOCIAL WORK

000. ORIENTATION. Familiarization with the department, requirements for majors, planning program of courses, university catalog and library. Also listed as Psychology 000 and Sociology 000. Required of department majors. 1 hour.

241. INTRODUCTION TO SOCIAL WELFARE. The historical development of health and welfare services, public and voluntary, from English and early American background to the present. Formerly 341. 3 hours.

342. SOCIAL WELFARE NEEDS AND RESOURCES. The programs of governmental, private and voluntary agencies, in meeting the problems of the aged, unemployed, disabled, handicapped, children and other special groups. 3 hours.

343. SOCIAL WORK CONCEPTS AND METHODS. Basic processes used in social work practices; social case work, social group work, and community organization. Prerequisite: Social Work 241 or 342. 3 hours.

441. SOCIAL WELFARE INVESTIGATION. Observation of the community agencies and an investigation as to the services that are provided, both in the governmental and voluntary sector. Prerequisite: Social Work 343. 3 hours.

442-443. FIELD EXPERIENCE IN A SOCIAL SERVICE AGENCY. Educationally directed field learning in a social service agency which offers students opportunities to acquire skills in social work practice, to try out social work practice roles in the field, and to test in a field setting the theories and principles learned in the classroom. Prerequisite: Social Work 441. 10 hours.

444. DOMESTIC LAW. Summary of nature and function of legal rules and the court system, with concentration in the area of juvenile and family law. Open to seniors. 3 hours.

ANTHROPOLOGY

315. PHYSICAL ANTHROPOLOGY. Basic concepts of physical anthropology; development of physical anthropology, relation to other branches of anthropology and other sciences; origins of life; taxonomy; primate evolution. 4 hours.

330. CULTURAL ANTHROPOLOGY I. An introduction to basic concepts; brief review of history of anthropology and its changing influence; application of anthropological knowledge. 3 hours.

331. CULTURAL ANTHROPOLOGY II. Kinship and political structures, economics, language and linguistics, education and technology, religion and ritual, the arts. Prerequisite: Anthropology 330. 3 hours.
SPEECH AND THEATRE
(Department 153)

ASSISTANT PROFESSOR LADWIG (Chairman); INSTRUCTORS LEE, RIGGLE, SCHUESSLER, WHITING; LECTURER VETRIE.

The Department of Speech and Theatre provides a concentrated and/or combination program which serves both the student and the community.

Speech courses are designed to provide the student with a basic knowledge in the art and skill of effective social communication. Beginning courses strive to provide meaningful integration of logical composition and effective delivery of structured, organized, and meaningful oral discourse; advanced courses investigate the theories, developments, and practices of this discipline. Beginning courses in Theatre seek to develop an understanding of the function of the dramatic art form in society, to foster appreciation of dramatic aesthetics, and to provide theatrical experiences to the community as a whole.

The programs in Forensics and Production are open to all students who have completed the basic requirement of Speech 100 and/or Theatre 105; such activities involve local, State, and National tournaments, and participation in theatrical events through University Theatre each quarter and/or the Children’s Theatre Tour and Lab Theatre each spring quarter. In addition to the cultural and service functions of the Department, a full course of Speech and Theatre education studies leading to Teacher Certification is provided, and a major may concentrate, beyond his basic Departmental requirements, on taking elective courses which will give him advanced studies in directing, acting, or technical theatre.

The major in Speech-Theatre requires a minimum of 45 hours beyond Speech 100 and Theatre 105, and must include the following from both areas:

**SPEECH:**
- 110 Argumentation 3 hours
- 254 Voice and Diction I 3
- 262 Oral Interpretation 3
- 272 Public Speaking 3
- 370 Speech Methods* 3
- 360 Parliamentary Procedure 1

**THEATRE:**
- 231 or 232 or 233 Stagecraft 3 hours
- 241 or 242 or 243 Theatre Hist. 3
- 282 and 283 Acting Tech. II & III 6
- 331 Makeup 1
- 386 Directing I 3

Therefore: Speech = 16 hours + Speech 100
Theatre = 16 hours + Theatre 105
32 hours + Speech 100 and Theatre 105
+ 1-3 hours in either Speech 497 or Theatre 498
(Independent Study)
33-35 hours total required + Speech 100 and Theatre 105

The additional hours shall be elected from within the Department to complete the minimum major requirement of 45 hours. Area of concentration may be obtained by electing

*non-certification majors may substitute an elective.
either advanced Speech or Theatre courses. Speech 100 and/or Theatre 105 are prerequisites for all advanced courses in the areas.

000. ORIENTATION. Familiarization with the departmental requirements for majors, planning program of courses, university catalog and library. Also listed as Theatre 000. Required of departmental majors. 1 hour.

100. SPEECH. Basic principles of oral communication with emphasis on individual needs. 3 hours.

110. ARGUMENTATION. Basic argumentative speaking and debate; proposition analysis; use of evidence, elementary logic, and case construction. 3 hours.

254-255. VOICE AND DICTION I AND II. Voice and speech production; intensive drill, on a phonetic basis, in articulating the sounds which make up the English language, with attention to the production of good vocal quality and expression. 6 hours.

260. SPEECH CORRECTION IN THE SCHOOLS. The recognition of speech disorders; speech and listening activities for the normal school child. 3 hours.

262. ORAL INTERPRETATION. The analysis and interpretation of the logic and emotional meaning in poetry, prose, and drama. Theories and practice in the art of oral interpretation. Prerequisite: Speech 254. 3 hours.

270. SPEECH ACTIVITIES. Extra-curricular debate and/or individual speech activities. May be repeated for graduation credit up to a maximum of six hours. S/U credit. 1 hour.

272. PUBLIC SPEAKING. More extensive application of basic principles of oral communication in the composition and delivery of original speeches. 3 hours.


360. PARLIAMENTARY PROCEDURE. Methodology of conducting formal meetings by parliamentary rules. 1 hour.

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

370. SPEECH METHODS. Investigation, survey, readings, methods, and application of teaching techniques in speech, theatre, and audiology and pathology. Required of all majors seeking certification. Prerequisite: acceptance into Teacher Education program. 3 hours.

371. GROUP COMMUNICATION. The process of group discussion and problem-solving techniques; opportunities to participate in and lead discussion. 3 hours.

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

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

494. SEMINAR IN SPEECH. 1-3 hours.

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

THEATRE

000. ORIENTATION. Familiarization with departmental requirements for majors, planning program of courses, university catalog and library. Also listed as Speech 000. Required of departmental majors. 1 hour.

105. THEATRE. General survey of theatrical and presentational art forms from primitive man through the present; emphasis includes art, music, drama, literature, television, radio, motion pictures, costuming, acting, design, criticism, directing, etc. 3 hours.

231. STAGECRAFT I. Introduction to theoretical and practical work in the fundamentals of theatre production. Required lab work. 3 hours.

232. STAGECRAFT II. Advanced practical work and applied theory in the fundamentals of theatre production. Required lab work. Prerequisite: Theatre 231. 3 hours.

241. THEATRE HISTORY I. History of the Theatre from the beginnings to 1500. 3 hours.

242. THEATRE HISTORY II. History of the Theatre from 1500 to 1850. 3 hours.

243. THEATRE HISTORY III. History of the Theatre from 1850 to the present. 3 hours.

250. PRODUCTION. Open only to those students who have auditioned for and have been awarded roles in major University Theatre productions; 1-3 hours of S/U credit, depending on role. Prerequisite: permission of director. May be repeated for graduation credit up to a maximum of 6 hours.

280. THEATRE ACTIVITIES. Participation in technical/productional aspects of University and/or Lab Theatre productions. A maximum of six hours may be taken for graduation credit. S/U credit. 1 hour.

281. ACTING TECHNIQUES I: VOCAL PRODUCTION. Introduction to exercises, improvisations, studies, etc., to develop acting skills with emphasis on vocal interpretation of characters. Enrollment in Theatre 386 may not be concurrent. 3 hours.
282. ACTING TECHNIQUES II: MOVEMENT. Continued exercises, improvisations, studies, pantomimes, etc., to develop acting skills with emphasis on physical interpretation of characters. Enrollment in Theatre 387 may not be concurrent. 3 hours.

283. ACTING TECHNIQUES III: LAB THEATRE. Advanced work leading to the presentation of character via performance. Enrollment in Theatre 388 may not be concurrent. 3 hours.

331. MAKEUP. Methodology and practice in the creation and application of stage makeup. Students compose makeup crews for University Theatre productions. Offered each quarter. 1 hour.

351. CHILDREN’S THEATRE I. Methods of acting, producing, writing and directing plays for young audiences with an understanding of the role of children’s theatre in modern society: readings in children’s dramatic literature. 3 hours.

352. CHILDREN’S THEATRE II. Selection, construction, costumes, rehearsal/preparation, etc. for Children’s Theatre Tour. Prerequisite: Theatre 351 and/or permission of Director. 3 hours.

353. CHILDREN’S THEATRE III. Actual performances and Children’s Theatre Tour. Prerequisite: Theatre 352 and/or permission of Director. 3 hours.

386. DIRECTING I. Methods and theories of directing. Prerequisites: 3 hours of Stagecraft plus 3 hours of Acting Technique. Enrollment in Theatre 281 may not be concurrent. 3 hours.

387. DIRECTING II. Exercises and practices in directorial concepts; production of scenes and/or one-acts in Lab Theatre. Prerequisite: Theatre 386. Enrollment in Theatre 282 may not be concurrent. 3 hours.

388. DIRECTING III. Rehearsal/preparation for student and/or faculty-directed plays; performances for University audiences. Prerequisite: Theatre 387. Enrollment in Theatre 283 may not be concurrent. 3 hours.

441. SCENE DESIGN. Methodology and practice in the arts of scene design; application via University Theatre, Children’s Theatre, and/or Lab Theatre productions. (Alternate years: offered 1974-1975.) Prerequisite: Theatre 231 or 232. 3 hours.

442. LIGHTING DESIGN. Methodology and practice in the arts of lighting design; application via University Theatre, Children’s Theatre, and/or Lab Theatre productions. (Offered each year.) Prerequisite: Theatre 231 or 232. 3 hours.

443. COSTUME DESIGN. Methodology and practice in costume design and construction; application via University Theatre, Children’s Theatre, and/or Lab Theatre productions. (Alternate years: offered 1974-1975). 3 hours.

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

495. SEMINAR IN THEATRE. 1-3 hours.

498. INDEPENDENT STUDY IN THEATRE. 1-3 hours.
THE THOMAS J. SMULL

COLLEGE OF ENGINEERING

LAWRENCE H. ARCHER, Dean.

ACADEMIC RECOGNITION

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

PURPOSE

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

HISTORY

During the ninety-two years of its existence the College of Engineering has had more than three thousand graduates. The Civil Engineering Department had its first class in 1882; Electrical Engineering, in 1898; and Mechanical Engineering, in 1904. These departments continue to function with the highest standards today.

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

Early application is advisable. 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, Ada, Ohio 45810. Each applicant for admission should read carefully the section of this catalog entitled ADMISSION TO THE UNIVERSITY (see Index). 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, though not required, 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 geometry, and at least one-half in trigonometry or the equivalent thereof. The sciences must include physics, and should include chemistry.

Students who meet the general university admission standard, but are found to be deficient in mathematics or physics, will be required to make up the deficiency. It is best to do this before the regular school year starts. If you have this problem, contact the College of Engineering early. Otherwise, it will take at least one summer session in addition to the regular four-year program or may require a fifth year.

B. Transfer Students. Students from other accredited colleges and universities entitled to honorable dismissal and eligible to return to the home institution may be admitted with advanced standing. Concealment of previous college attendance is cause for revocation of admission. Advance credit from other institutions of higher learning will not be given for more than 150 quarter hours or their equivalent. The work must be “C” level or better.

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

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

STUDENT'S ACADEMIC STATUS

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

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

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

Students in academic difficulty are required to meet with their adviser more frequently than those who progress satisfactorily. *Students on probation are not eligible to participate in extra-curricular activities.* Some exceptions are made based upon the recommendation of the adviser and Dean of Men to the Dean of Engineering. Since it is the desire to treat each student as an individual, the student must initiate the procedure for becoming eligible to participate in extra-curricular activities when he or she is on probation.

CLASSIFICATION

The traditional terms of freshman, sophomore, junior, and senior are used. Engineering education is vertical in nature insofar as most courses are sequential. The level at which the student is studying is far more consequential than the hours accumulated or the years spent in school.

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

In addition to meeting specific course requirements, a minimum of 200 academic hours or the equivalent is required for graduation. The student must have a scholarship rating of at least two quality points for each credit hour scheduled with an accumulative point average of 2.0 in all engineering courses. A student is not permitted to be a candidate for more than one degree at any one time, the Arts-Engineering program excepted.

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

At commencement 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 as a Professional Engineer by the state, necessary for professional practice, requires licensing examinations and four years of experience following the completion of the academic work. Full information is given in the first and last years while in school and is available from the Dean of the College of Engineering or from the Secretary of the Board of Registration for Professional Engineers, 21 West Broad Street, Columbus, Ohio 43215.

THE ROBERT W. BIGGS ENGINEERING BUILDING

The College of Engineering occupied its new facility in the summer of 1971. It is a completely new 1.8 million dollar modern structure, which was dedicated on February 26, 1972. Included in this ninety-one room engineering building are classrooms, laboratories, and faculty offices. The addition of the Robert W. Biggs Engineering Building to the campus completes the Science Complex on the new one hundred acre campus.

COMPUTER CENTER

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

Two courses, which use the Computer Center as a laboratory, are required of first year engineering students. Each student is his own operator, and does his own work within the Center. The use of the Center is intended to become an integral part of the engineer’s education, and is required in other engineering course work.

The Center contains a scientific IBM 1620 Digital Computer, a 1622 Card Reader Punch, a 1311 Random Access Disk file, a 1443 Printer, and needed support equipment, all located within the engineering building.

PRE-ENGINEERING CURRICULA

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

ARTS-ENGINEERING CURRICULA

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

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

### FIRST YEAR

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<td>Chemistry (122171-2-3)</td>
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### FIFTH YEAR

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BASIC ENGINEERING

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

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

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

BASIC ENGINEERING: DESCRIPTIONS
(Department 201)

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

101-102. DIGITAL COMPUTER 1 AND 2 (2 + 1).* An introduction to digital computation. Organization and function of digital computers. Programming principles and practice. Prerequisite: Math 163 or concurrently. 4 hours.

112. GRAPHICAL ANALYSIS (1 + 3). An introduction to graphical methods with emphasis on graphic communications and design, including: the ability to convey ideas by the use of engineering sketches; the construction of professional drawings; graphical presentation of data; and graphical calculus. 2 hours.

114. CREATIVE DESIGN (1 + 3). Participation in student-generated group design projects emphasizing engineering methodology, design, analysis and communicative skills. Prerequisite: 112. 2 hours.

*(2 + 1) indicates the student contact hours per week. The first number gives the lecture hours while the second, shows the laboratory hours.
321. PASSIVE AND ACTIVE CIRCUITS 1 (3 + 0). Introductory concepts in circuit analysis. Solution of resistive circuits using Ohm's and Kirchhoff's Laws, mesh and nodal analysis, and network theorems. Prerequisite: 233, Math 262. 3 hours.

322. PASSIVE AND ACTIVE CIRCUITS 2 (3 + 0). Analysis of circuits in the sinusoidal steady-state. Phasor solution, effective values of current and voltage, instantaneous and average power, polyphase circuits, series and parallel resonance. Prerequisite: 321. 3 hours.

ALL ENGINEERING — CLASS OF 1977

FRESHMAN, 1973-74

(F)  (W)  (S)

English (112100-1-2)  3  3  3

Anal. Geom., Calculus 1, 2 (123163, 261-2)  5  4  4

Orientation, Physics 1, 3 (201120, 124231-3)  1  5  5

Digital Comp. 1, 2, S.S. Elective (201101-2)  2  2  3

Graph. Anal., Creative Design (201112-4)  2  2

Physical Education (143001-2-3)  1  1  1

Totals  14  17  16

ALL ENGINEERING — CLASS OF 1976

SOPHOMORE, 1973-74

(F)  (W)  (S)

Calculus 3, 4 Diff. Eqs. (123263-4, 361)  4  4  4

Physics 2, Chemistry, Science Elective*  5  4  3

(124232, 122171 . . . )

Social Science Elective  3  3  3

Engr. Mechanics 1, 2, 3 (201311-2-3)  3  3  3

P + A Circuits 1, 2, 3 (201321-2-3)  3  3  3

Circuits Lab. 1, 2 (201332-3)  1  1

Totals  18  18  17

*Acceptable Science Electives: Chemistry 172, Biology, Physics 300 level.

120. ORIENTATION FOR ENGINEERING STUDENTS (1 + 0). Schedules, irregularities in schedules, graduation requirements, class preparations, problem solutions, taking of tests, slide rule, background of various branches of engineering, technical and professional organizations and professionalism are covered. Designed to help the student to make the transition to college, as well as, properly orient the student in the profession. 1 hour.

311. ENGINEERING MECHANICS 1 (3 + 0). Fundamental principles of statics with vector methods. Emphasis on free body diagrams and equations of equilibrium. Includes resultants of force systems, centroids and centers of gravity, equilibrium, friction, and moments of inertia. One section is taught as Individualized Instruction and includes one three-hour laboratory and two one-hour discussions each week. Prerequisite: Math 262, Physics 231. 3 hours.
312. ENGINEERING MECHANICS 2 (3 + 0). Fundamental principles of mechanics with vector methods as applied to dynamics. Includes absolute and relative motion; force, mass and acceleration; work and energy; and impulse and momentum. Prerequisite: 311. 3 hours.

313. ENGINEERING MECHANICS 3 (3 + 0). Elastic analysis through concepts of stress and strain in tension, torsion, compression, and flexure. Development and application of Mohr’s circle construction; analytical methods of determining shear stresses in beams subjected to torsional and flexural loadings, and shear and moment diagrams. One section is taught as Individualized Instruction and includes one three-hour laboratory and two one-hour discussions each week. Prerequisite: 312. 3 hours.

323. PASSIVE AND ACTIVE CIRCUITS 3 (3 + 0). Magnetically coupled circuits, two-port networks and Fourier analysis. Prerequisite: 322. 3 hours.

332-333. CIRCUITS LABORATORY 1 AND 2 (0 + 3). A laboratory study of electric circuits. Prerequisite: 322 concurrently. 2 hours.

401. APPLIED RANDOM PROCESSES (3 + 0). Probability and its application to engineering problems. Random processes in engineering, distributions, and regression analysis. Prerequisite: Math 264. 3 hours.
CIVIL ENGINEERING DEPARTMENT

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

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

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

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

CIVIL ENGINEERING — CLASS OF 1975

JUNIOR, 1973-74

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Mechanics of Materials, Similitude, Geology (202401, 465, 453)</td>
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<tr>
<td>Computer Aided Design, Structural Systems Analysis 1, 2 (202411-2-3)</td>
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<tr>
<td>Applied Random Processes, Fluid Mechanics, Hydraulics (201401, 202422-3)</td>
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<tr>
<td>Urban Planning, Transportation, Materials Science (202434-5, 456)</td>
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<tr>
<td>Biology*, Ecology*, Environmental Science* (112100, 112423, 202437)</td>
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<td>Totals</td>
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<td>16</td>
<td>17</td>
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*These courses may have substitutions with the approval of the Civil Engineering Department Faculty. Courses which may be substituted include: Astronomy 124250; Mechanical Measurements 204434; Business Law 131322; General Chemistry 122173; Physical Chemistry 122341; Modern Physics 124303; Nuclear Physics 124353; Biochemistry 302341; Microbiology 306361; Thermo 1, 2 204415, 6; Engineering Analysis 1, 2 203444-6; Analytical Methods 1, 2 204424-5; Engineering Analysis 204435; Engineering Materials 204446; or others with faculty approval.

During the Junior and Senior year, the student has seven courses like this. Two of these courses must be in a Social Science area to achieve a required depth. These two courses are to be chosen by the student and his advisor.
CIVIL ENGINEERING — CLASS OF 1974

SENIOR, 1973-74

Environmental Engineering 1, 2 (202514-6) 3 (F) 3 (S)
Structural Design 1, 2, Structural
   Systems Design* (202547-8, 523) 4 (W) 3 (S)
Soils 1, 2, Construction Systems* (202531-2-3) 4 (W) 5 (W) 3 (S)
Reinforced Concrete 1, 2 (202525-6) 4 (W) 3 (S)
CE Senior Seminar*, Structural
   Systems Analysis 3* (202551, 555) 3 (S) 3 (S) 4 (S)
Surveying¹
Philosophy, Religion (115100-5) 4 (W) 4 (S)
Totals 18 19 16

¹The student is encouraged to discuss with his advisor the possibility of taking this course during an earlier year to help him prepare for more meaningful summer employment.
*These courses may have substitutes. Same notes applies as that listed with Junior year

CIVIL ENGINEERING: DESCRIPTIONS
(Department 202)

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

303. SURVEYING (2 + 6). Use of level and transit, differential and profile leveling, traversing, theory and practice with horizontal and vertical curves, fundamentals of aerial photography. Prerequisite: Departmental permission. 4 hours.

401. MECHANICS OF MATERIALS (3 + 0). Deflection, combined loadings, repeated loading dynamic loading, connections, formulation of statically indeterminate problems. One section is taught as Individualized Instruction and includes one three-hour laboratory and two one-hour discussions each week. Prerequisite: 20313. 3 hours.

411. COMPUTER AIDED DESIGN 1 (3 + 3). Principles of numerical analysis used in solving structural problems, numerical methods, linear programming, optimization, finite element, finite difference, and applications. Prerequisite: Math 361. Concurrently 202401. 4 hours.

412. STRUCTURAL SYSTEMS ANALYSIS 1 (3 + 3). Fundamentals of statically determinate structures; deflections, displacements, use of models to illustrate structural behavior, principle of superposition and study of elastic curve. Prerequisite: 411. 4 hours.

413. STRUCTURAL SYSTEMS ANALYSIS 2 (3 + 3). Fundamentals of statically indeterminate structures; classical and approximate methods of solution. Prerequisite 412. 4 hours.

422. FLUID MECHANICS (2 + 3). Engineering properties of fluids, fluid statics, fluid dynamics, fluid resistance, boundary layer theory, steady flow in closed circuits and the introduction of flow through porous media. Prerequisite: 201312. 3 hours.
423. HYDRAULICS (2 + 3). Hydraulic analysis of piping systems using the digital computer. Steady flow in open channels, non-uniform flow in open channels, elements of Hydrology, introduction to chemical quality control of surface and subsurface waters. Prerequisite: 422. 3 hours.

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

435. TRANSPORTATION (3 + 0). Principles of transportation systems; economics, finance, and planning; and design construction and maintenance. Prerequisite: 434. 3 hours.

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

456. MATERIALS SCIENCE (3 + 0). A study of the fundamental physical and chemical properties of engineering materials and how they relate to mechanical behavior. Prerequisite: 201313. 3 hours.

465. SIMILITUDE (2 + 3). Types of similitude dimensional analysis, and theory of models. Prerequisite: 201313, concurrently 202422. 3 hours.

473. ENVIRONMENTAL SCIENCE (3 + 0). Microbiological and chemical aspects of water and waste treatment. Air pollution controls and standards. Prerequisite: Permission of instructor. 3 hours.

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

514. ENVIRONMENTAL ENGINEERING 1 (2 + 3). Development of sources of water supply; determination of quantity of storm water; design of water distribution systems, storm water sewers, and sanitary sewers; hydraulic design of water and sewage treatment plants. Prerequisite: 423. 3 hours.

516. ENVIRONMENTAL ENGINEERING 2 (2 + 3). 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: 514. 3 hours.

523. STRUCTURAL SYSTEMS DESIGN (2 + 3). Design of structural systems emphasizing optimization, creativity, and decision making. Prerequisites: 526, 547. 3 hours.

525. REINFORCED CONCRETE 1 (3 + 3). Elastic design and ultimate strength of structural elements, beams in bending, bond, shear; diagonal tension in beams, axially loaded columns, and eccentrically loaded columns; and application of codes and specifications to design. Prerequisites: 413, 452. 4 hours.
ELECTRICAL ENGINEERING DEPARTMENT

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

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

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

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

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

ELECTRICAL ENGINEERING: DESCRIPTIONS
(Department 203)

411. PROFESSIONAL METHOD (3 + 0). This course is focused on the professional method of dealing with problems, the orderly mental processes the professional engineer uses in practice. Prerequisite: Math 361. 3 hours.

412-413. FIELDS AND WAVES 1 AND 2 (3 + 0, 4 + 0). Electrical phenomena from the viewpoint of field theory. Vector analysis used throughout. Prerequisite: 441. 7 hours.

421. SOLID STATE ELECTRONICS (3 + 0). The basic physical principles of the internal operations of electronic devices are studied. Prerequisite: 201323. 3 hours.

422. ELECTRONICS 1 (4 + 0). Operating principles of electronic devices (diodes, BJTs, and FETs), models representing these devices, and their use in simple circuitry. Prerequisite: 421 or consent. 4 hours.

423. ELECTRONICS 2(4 + 0). Large and small signal amplifiers, frequency response of amplifiers, and oscillators. Prerequisite: 422. 4 hours.

433. ENERGY CONVERSION 1 (3 + 0). The underlying principles of energy conversion. Prerequisite: 412. 3 hours.

441. ENGINEERING ANALYSIS 1 (4 + 0). Selected analytical methods with engineering applications. Emphasis is on methods using complex variables and vector calculus. Prerequisite: Math 361. 4 hours.
526. REINFORCED CONCRETE 2 (2 + 3). Retaining walls, footings, slabs, and thin shell roofs. Fundamentals of prestressing. Prerequisite: 521. 3 hours.

531. SOILS 1 (3 + 3). An introduction to soils engineering, physical properties of soils as affecting engineering design and construction, soil sampling, mechanics of soil masses, consolidation, settlement, and laboratory soil tests. Prerequisites: 423, 453. 4 hours.

532. SOILS 2 (4 + 3). Analysis of stress conditions imposed on the supporting soils by foundations. Design of foundations, retaining structures and piles. Prerequisite: 531. 5 hours.

533. CONSTRUCTION SYSTEMS (2 + 3). Specifications, economical construction methods, estimating critical path, fundamentals of PERT, engineering economics as applied to various engineering projects. Prerequisite: Departmental permission. 3 hours.

547. STRUCTURAL DESIGN 1 (3 + 3). The design of beams, columns, built-up members, and connections as applied to structural steel. Use of influence lines and various other techniques for determining maximum loadings. Prerequisite: 413. 4 hours.

548. STRUCTURAL DESIGN 2 (2 + 3). Theory of plastic design, analysis of ultimate load, design of connections, determination of deflections using plastic design, and comparison to elastic design. Prerequisite: 547. 3 hours.

551. CIVIL ENGINEERING SEMINAR (3 + 0). Topics not currently in curriculum. Oral and written presentation by students. Prerequisite: Departmental permission. 3 hours.

555. STRUCTURAL SYSTEMS ANALYSIS 3 (3 + 0). Study of selected topics in advanced structural mechanics. Prerequisite: 413. 3 hours.

591-592-593. INDEPENDENT STUDY. The independent planning of an engineering design project or the individual study of a topic of particular interest to the student. Prerequisite: Senior status and Departmental permission. 1-3 hours.
442. LINEAR SYSTEMS 1 (3 + 0). Application of Laplace Transform methods to transient phenomena in linear electrical and mechanical systems. Prerequisite: 201323, 441. 3 hours.

443. LINEAR SYSTEMS 2 (3 + 0). A continuation of 442. State variable techniques and digital computer solution of linear transient problems. Prerequisite: 442. 3 hours.

451. ELECTRICAL ENGINEERING LABORATORY 1 (0 + 3). Instrumentation and measurement circuits and techniques. Prerequisite: 201323. 1 hours.

452-453. ELECTRICAL ENGINEERING LABORATORY 2 AND 3 (0 + 3). Study of active devices and their associated circuits. Prerequisite: 423 concurrently. 2 hours.

461. DIGITAL COMPUTER TECHNIQUES (1 + 3). Instruction in the use and practicability of numerical methods in engineering problem solutions. Prerequisite: 201102. 2 hours.

463. ANALOG COMPUTER TECHNIQUES (1 + 3). Instruction in the use and practicability of analog computer methods in engineering problem solutions. Prerequisite: 443 concurrently. 2 hours.

**ELECTRICAL ENGINEERING — CLASS OF 1975**

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<th>Course Description</th>
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<tr>
<td>Prof. Methods, Fields + Waves 1, 2 (203411-2-3)</td>
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<td>Solid State Electronics, Electronics 1, 2 (203421-2-3)</td>
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<td>Energy Conversion (203433)</td>
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<td>Engr. Anal. 1, Linear Systems 1, 2 (203441-2-3)</td>
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<td>Electrical Engr. Lab. 1, 2, 3 (203451-2-3)</td>
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<td>Dig. Comp. Tech., Anal. Comp. Tech. (203461-3)</td>
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<td>Philosophy, Religion (115100-5)</td>
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SENIOR, 1973-74
Microwave Theory, Cir. Syn., NonLinear
(203511-2-3)
Electronics 3, E.E. Electives
(203521, 203 . . . , 203 . . . )
Energy Conv. 2, E.E. Electives
(203531, 203 . . . , 203 . . . )
(203541, . . . , . . . )
Non-E.E. Electives (. . . , . . . , . . . )
Electrical Engr. Lab. 4,6,8 (203551-2-3)
Electrical Lab. 5,7 (203561-2)

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511. MICROWAVE THEORY AND TECHNIQUES (3 + 3). A study of the principles of energy transmission using transmission lines, wave guides, and antennas. Prerequisite: 413. 3 hours.

512. CIRCUIT SYNTHESIS (3 + 0). Introduction to the Principles of modern circuit synthesis. Prerequisite: 443. 3 hours.

513. ACTIVE CIRCUIT SYNTHESIS (3 + 0). A continuation of circuit synthesis but includes active elements such as gyrators, operational amplifiers and similar devices. The emphasis is on design and application. Prerequisite: 512. 3 hours.

521. ELECTRONICS 3 (3 + 0). Introduction to devices and circuits for the generation and processing of pulse, digital, and switching waveforms. Prerequisite: 423. 3 hours.

522. ELECTRONICS 4 (2 + 3). Continuation of 521 with emphasis on logic and memory circuits. Prerequisite: 521. 3 hours.

523. ELECTRONICS 5 (2 + 3). Electronic power conversion circuits and devices. Power control and regulator circuits. Prerequisite: 522. 3 hours.

531. ENERGY CONVERSION 2 (3 + 0). Steady state and transient analysis of direct current and alternating current machinery. Prerequisite: 433. 3 hours.

532. ENERGY CONVERSION 3 (3 + 0). An introduction to power systems analysis with load flow, faults and stability topics. Prerequisite: 531. 3 hours.

541. CONTROL SYSTEMS 1 (3 + 0). An introduction to the basic theory of feedback control devices. Transfer function formulation, frequency response, root locus and stability are studied. Prerequisite: 443. 3 hours.

542. CONTROL SYSTEMS 2 (2 + 3). A continuation of 541. Additional root locus techniques and compensation are studied. Prerequisite: 541. 3 hours.
543. CONTROL SYSTEMS 3 (2 + 3). Group or individual study of selected topics of current interest in Feedback Control Theory. Topics included might be modern control theory, sampled data systems, or hardware oriented individual projects. Prerequisite: 542. 3 hours.

551. ELECTRICAL ENGINEERING LABORATORY 4 (0 + 3). Laboratory study of electronic wave shaping and switching circuits. Prerequisite: 521. concurrently. 1 hour.

552. ELECTRICAL ENGINEERING LABORATORY 6 (0 + 3). Laboratory study of transmission line and microwave circuits. Prerequisite: 511. 1 hour

553. ELECTRICAL ENGINEERING LABORATORY 8 (0 + 3). Laboratory study of nonlinear systems utilizing real nonlinear devices plus analog and digital computer techniques. Prerequisite: 513. concurrently. 1 hour.

561. ELECTRICAL ENGINEERING LABORATORY 5 (0 + 3). Laboratory study of feedback control systems. Prerequisite 541. concurrently. 1 hour

562. ELECTRICAL ENGINEERING LABORATORY 7 (0 + 3). Study of the generalized machine and other DC, synchronous, and induction machines. Prerequisite: 531. 1 hour.

572. COMMUNICATION THEORY 1 (3 + 0). An introduction to the principles of communication theory. Prerequisites: 423, 443. 3 hours.

573. COMMUNICATION THEORY 2 (3 + 0). Continuation of 572 and current topics in communication including negative impedance devices and applications. Prerequisite: 572. 3 hours.

583. NONLINEAR ANALYSIS (3 + 0). Analysis of physical systems containing nonlinear elements. Analytical, graphical, and numerical methods are studied. Prerequisite: 544. 3 hours.

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

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

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

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

PROFESSORS BURTON (Chairman), SCROGGIN; ASSOCIATE PROFESSOR FARRINGTON; ASSISTANT PROFESSOR WHISLER; INSTRUCTOR BASINGER.

Mechanical Engineering is that branch of the profession of engineering which is concerned with the conversion of energy from one form to another, the design of machines, and the control of various processes. Mechanical Engineers are involved in creative design, research, development, and management. They are being challenged today, as never before, to solve many critical problems related to pollution, mass transportation and the supply of energy.

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 also provide the opportunity for individual as well as group projects and limited undergraduate research.

MECHANICAL ENGINEERING — CLASS OF 1975

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<td>Applied Random Processes, Thermo. 1,2 (201401, 204415-6)</td>
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MECHANICAL ENGINEERING — CLASS OF 1974

SENIOR, 1973-74

Mech. Des. 1, Mech. Des. 2, Vib. Analysis (204514-5-6)                             \( (F) \) \( (W) \) \( (S) \)
4
Control Syst., M.E. Lab. 2, M.E. Lab. 3 (204524-5-6)                                \( (F) \) \( (W) \) \( (S) \)
5
Fluid Mech. 2, Heat Transfer, Ther. Syst. Des. (204534-5-6)                         \( (F) \) \( (W) \) \( (S) \)
3
*Tech. Elect., Tech. Elect., Syst. Des. \( (\ldots, \ldots, 204546) \)         \( (F) \) \( (W) \) \( (S) \)
3
Electives \( (\ldots, \ldots, \ldots) \)                                              \( (F) \) \( (W) \) \( (S) \)
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Totals                                                                                   \( (F) \) \( (W) \) \( (S) \)
18
16
15

MECHANICAL ENGINEERING: DESCRIPTIONS
(Department 204)


405. THEORY OF MACHINES 1 \( (3 + 3) \). Analysis and synthesis of mechanisms for motion, velocity and acceleration properties. Linkages, cams, gears and gear trains are treated. Laboratory assignments deal with analysis, synthesis and construction of working mechanism models. Prerequisite: 201312. 4 hours.

406. THEORY OF MACHINES 2 \( (3 + 0) \). Review of static-force analysis using means of vector notation. Dynamic planar and spatial force analysis, balancing of rotating masses, partial balance of reciprocating devices, cam dynamics and introduction to mechanical vibrations. Prerequisite: 405. 3 hours.

415. THERMODYNAMICS 1 \( (4 + 0) \). Fundamentals of classical thermodynamics. Heat, work and properties of pure substances. The First and Second Laws of Thermodynamics. Irreversibility and availability and treatment of some power and refrigeration cycles. Prerequisite: Chemistry 171, Physics 232. 4 hours.

416. THERMODYNAMICS 2 \( (4 + 0) \). Relations among thermodynamic properties, mixtures, chemical reactions and equilibrium. Prerequisite: 415. 4 hours.

424. ANALYTICAL METHODS 1 \( (4 + 0) \). A treatment of numerical methods applicable to problems arising in engineering practice; exact and approximate solutions are investigated; finite methods are used for linear and nonlinear equation solution; ordinary and partial differential equations are treated. Prerequisite: Math 361. 4 hours.

425. ANALYTICAL METHODS 2 \( (4 + 0) \). A study of the use of vector analysis in Mechanical Engineering problems, including gradient, divergence, and curl operations; complex variables and conformal representations with application to fluid flow and heat transfer; Laplace transform theory and applications. Application and use of matrices. Prerequisite: Math 361. 4 hours.
426. FLUID MECHANICS 1 (3 + 0). An introduction to the mechanics of fluids; the state of stress in a static fluid; similitude and dimensional analysis; the dynamics of inviscid ideal fluids, Euler’s equation, Bernoulli’s equation, momentum equation and turbomachinery; vorticity and concepts of aerodynamics; an introduction to potential flow. Prerequisite: 201312. 3 hours.

434. MECHANICAL MEASUREMENTS (2 + 3). An introduction to the theory of engineering experimentation through study of basic detector-transducer systems, intermediate amplification devices and readout devices; management of data with the use of measuring standards; study of the propagation of errors; and the fitting of curves to experimental data. Prerequisite: Junior status. 3 hours.

435. ENGINEERING ANALYSIS (3 + 0). The professional method as it applies to the analysis of engineering problems. Emphasis is placed on learning to deal with new situations in terms of fundamental principles. Prerequisite: 424. 3 hours.

436. MECHANICAL ENGINEERING LABORATORY 1 (0 + 6). Continuation and expansion of the concepts developed in 434 with specific emphasis on: the development of basic fluid flow processes in conjunction with the Fluid Mechanics course (concurrent); the development of analog simulation and solution techniques utilizing modern analog computation devices. The measurement of material properties and the use of stress analysis techniques. Prerequisite: 434. 2 hours.

446. ENGINEERING MATERIALS & PROCESSES (4 + 0). Introduction to structure and properties of metals and alloys. Characteristics of common engineering materials including iron, steel and their alloys. Metal working processes and their heat treatment as well as other contemporary metal processes. Engineering processes which cover the basic machining operations, their machines, tools, equipment and the control for automation and mass production. Prerequisite: Chem. 171. 4 hours.

514. MECHANICAL DESIGN 1 (3 + 3). Sequence of design of machine elements: analytical study of conventional components and units, their sizing and shaping, then calculation as well as proportions and ratios. Preparation and execution of sketches and drawings according to professional standards. Initiation of comprehensive systems design project. Prerequisite: 446. 4 hours.

515. MECHANICAL DESIGN 2 (3 + 3). Execution of complete designs of machines or units applying previously studied components and mechanisms in order to develop engineering judgment and professional proficiency from the original conception of an idea to the finished product. Continuation of comprehensive systems design project. Prerequisite: 514. 4 hours.

516. VIBRATION ANALYSIS (3 + 0). Fundamentals of linear and non-linear vibration of single degree of freedom, multi-degree of freedom, and continuous systems. Prerequisite: 406. 3 hours.
524. CONTROL SYSTEMS (4 + 3). Modeling, analysis and design of linear feedback control systems. Laplace transforms, transfer functions, frequency response and root locus techniques. Laboratory work in analog simulation of dynamic systems and performance studies of real systems. Prerequisite: 406. 5 hours.

525-526. MECHANICAL ENGINEERING LABORATORY 2 and 3 (0 + 6). Individual and group projects with particular emphasis on planning and report writing. Upon the recommendation of the Mechanical Engineering faculty a student may undertake a two quarter in depth, experimental study, with a specific faculty member as project advisor. Prerequisite: 436. 4 hours.

534. FLUID MECHANICS 2 (3 + 0). Principles of viscous fluid mechanics; the Hagen-Poiseville equation; Navier-Stokes equations; compressible fluid mechanics; one-dimensional isentropic flows; shock waves; interaction of real fluid effects; non-continuous effects. Prerequisite: 426. 3 hours.

535. HEAT TRANSFER (4 + 0). Conduction of heat in the steady and non-steady states; graphical and numerical methods of solution; conduction in two and three dimensions; radiation heat transfer; free and forced convection heat transfer; heat transfer with change in phase. Prerequisite: 534. 4 hours.

536. THERMAL SYSTEMS DESIGN (3 + 3). Heat power systems design utilizing the concepts of heat transfer, fluid mechanics and thermodynamics combined with engineering systems design; study of the optimization of thermal systems; emphasis on the use of computational facilities as system design tools. Prerequisite: 535. 4 hours.

545. ADVANCED CONTROL SYSTEMS (3 + 0). Nonlinearities in system performance; their origins and importance. Solution methods (exact, numerical, graphical and approximate) and stability analysis for nonlinear systems. Prerequisite: 524. 3 hours.

546. SYSTEMS DESIGN (2 + 3). Completion of the comprehensive systems design project initiated in 514. Legal, sociological, economic and other factors affecting the design of systems are discussed. Prerequisite: 515. 3 hours.

556. PRODUCTION ENGINEERING (3 + 0). An introduction to scientific organizing, standardizing, and operating principles in production engineering. Basic industrial management and principles of engineering administration. Capabilities of manufacturing processes, analysis of machining, and metal removing requirements—tools, dies, jigs and fixtures, and special machinery. Fundamentals of time and motion study, quantity and quality control, space, location and material flow for a manufacturing enterprise. Prerequisite: 446. 3 hours.

590. MECHANICAL ENGINEERING PROJECTS. Practical studies of investigations involving the application of original thought, the determination of new information and/or new application of known information or equipment. Prerequisite: Senior status. 1-5 hours.
OF PHARMACY
THE RUDOLPH H. RAABE

COLLEGE OF PHARMACY

LEROY D. BELTZ, Dean.

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

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

The Raabe College of Pharmacy is an integral part of Ohio Northern University. It is recognized and approved by the Board of Pharmacy of the State of Ohio. It is a member of the American Association of Colleges of Pharmacy and is accredited by the American Council on Pharmaceutical Education.

For the purposes of administration the pharmacy program is divided into two major divisions; the Lower Division, consisting of the first two years (P-1 and P-2), and the Upper Division, consisting of the last three years (P-3, P-4, and P-5).

AIMS AND OBJECTIVES

In addition to the general objectives set forth by the University, the College of Pharmacy includes the following among its aims and purposes:
Preparing students to meet satisfactorily the professional and cultural standards expected of pharmacists and to carry their share of the responsibility for improvement of the quality of the health, welfare and educational services to their respective communities.

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

Acquainting students with the need for the 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 of life.

ADMISSION TO THE COLLEGE OF PHARMACY

Persons seeking admission to the College of Pharmacy must provide the necessary information and meet the general requirements for admission to the University, as listed in that section of this catalog. Students who qualify under those standards are reviewed for final approval for admission by the Admissions Committee of the College of Pharmacy.

Students are permitted to enter the pharmacy program either as high school graduates or as transfer students from other recognized colleges.

*High School Graduates.* It is recommended that high school graduates entering the pharmacy curriculum should have completed the college preparatory course, including four years of English, three years of mathematics (algebra I and II and plane geometry), and three years of science (preferably general science, biology, and chemistry or physics). Priority will be granted to students with additional credits. Students found to be deficient in these areas may be required to pursue remedial work prior to being scheduled in the regular course of study.
Transfer Students. A student desiring to transfer from another accredited college or university must present a transcript of his record at that institution and a copy of their current catalog. Approval for admission and advanced placement will be determined by the Admissions Committee of the College of Pharmacy upon review of student’s previous record. Full credit will be given for all work satisfactorily completed in other recognized institutions of higher learning, provided such work is parallel to the requirements for graduation in this institution. 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 advisor and approval of the Dean, and pay tuition and fees as stated elsewhere in this catalog.

Students entitled to advanced standing may enter at the time approved by the Dean. All required courses in the Lower Division must be completed before the student is permitted to enter the second year of the Upper Division.

CLASSIFICATION OF STUDENTS

Students enrolled in the College of Pharmacy are classified as P-1 students until they have earned a minimum of thirty-eight quarter hours credit, at which point they are advanced to P-2 standing. In order to gain admission to the Upper Division and P-3 status, a student must have completed a minimum of 84 quarter hours of academic work and all of the Lower Division courses that are prerequisite to the regular third year schedule. P-4 or P-5 standing is gained when a majority of the required course work in the previous year has been completed and a minimum of 130 and 175 quarter hours of academic credit respectively, has been earned. Additionally, students, whose accumulative average in their professional courses is below a 1.80, are not eligible for advancement to the P-4 class. In the same manner students, whose professional accumulative average is below a 2.00, are not eligible for P-5 standing.
ARTS-PHARMACY CURRICULUM

Superior students may elect to earn the Bachelor of Arts degree in the College of Liberal Arts concurrently with the Bachelor of Science degree in the College of Pharmacy. The student following this option pursues both degrees simultaneously under the supervision of a professional advisor from the College of Pharmacy and an adviser selected from the department of his chosen major in the College of Liberal Arts. Tuition is charged at the College of Pharmacy rate and the student receives the appropriate degree in each college upon completion of all graduation requirements.

A student taking the dual degree program must meet all of the requirements established for each degree. Certification of completion of these requirements is made by the college granting the degree.

Information relative to the procedure for declaring a second major is available in the office of the Dean of Pharmacy.

STANDARDS OF SCHOLARSHIP

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

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

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

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

If action is taken to suspend a student the suspension will be for a definite period of time after which the student will be eligible to resume his studies. When readmission is granted, the faculty may establish certain conditions of academic performance in order for the student to remain enrolled in the College of Pharmacy.
If action is taken to dismiss a student, it is to be regarded as a terminal action; therefore, the student is not eligible for readmission to the College of Pharmacy at any time thereafter.

REQUIREMENTS FOR GRADUATION

Each candidate for a degree:

1. Must be of good moral character.
2. Must have completed the required curriculum as determined by the faculty of the College of Pharmacy and sufficient elective courses to total 234 quarter hours of credit. Every graduate must select 12 hours of electives from the Division of Social Sciences and 12 hours from the Divisions of Fine Arts and/or Humanities.
3. Must have earned an accumulative grade point average of 2.0 in all course work and have maintained an accumulative grade point average of 2.0 in all professional courses as defined by the American Council on Pharmaceutical Education.
4. Must satisfy a minimum residency requirement of three academic years (9 quarters) of full-time enrollment in an accredited college of pharmacy. Transfer students from schools of pharmacy accredited by the American Council on Pharmaceutical Education must complete a full-time residency of not less than three quarters (senior year) in the Ohio Northern University College of Pharmacy.
5. Must be recommended for the degree by a majority vote of the faculty of the University.
6. Must meet such other qualifications as the faculty may determine.

LIBRARY

The facilities of the main library of the University are at the disposal of the pharmacy students. Many of the current books and classics contributing to an appreciation of the liberal arts and sciences are to be found there along with books, periodicals, and journals pertaining to pharmacy, medicine, and related professions. Current issues of pharmaceutical and related professional journals are available in the reading rooms of the College of Pharmacy.
SPECIAL NOTICE

The pharmacy curriculum, because of rapid developments in the medical and allied professions, is constantly being reviewed by the faculty. The College of Pharmacy reserves the right, without advance notice, to change the content, duration and sequence of any course included in the curriculum leading to the degree. A separate catalog or bulletin covering course content and other pertinent matters is issued periodically. Please address requests for copies to the Dean of Pharmacy, Ohio Northern University, Ada, Ohio 45810.
## PROGRAM OF STUDY LEADING TO THE DEGREE OF
BACHELOR OF SCIENCE IN PHARMACY

### CURRICULUM

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* — Graded Satisfactory or Unsatisfactory (No credit toward honor point average)
COURSE DESCRIPTIONS

For descriptions of the Lower Division courses turn to the listing of the courses offered in the College of Liberal Arts.

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

Courses listed with an asterisk are elective.

DEPARTMENT OF PHARMACY
(Department 301)

PROFESSORS BELTZ, STUART; ASSOCIATE PROFESSORS FITZGERALD, THEODORE (Chairman), VOTTERO; ASSISTANT PROFESSORS SHEUMAKER, STANSLOSKI; INSTRUCTOR SHOEMAKER; LECTURER SHERWIN; CLINICAL ASSOCIATES DeLEONE, TURNER, WELLINGTON, WOODRUFF.

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

321-322-323. PHARMACEUTICS I, II, and III. (3 + 3). This sequence incorporates a new concept of an integrated approach to the study of dosage forms. Topics are presented to students in block style including factual, technical and theoretical material in an integrated fashion. Topics range in scope from fundamental calculations and formulation to rheology and reaction kinetics. The goal of the course is to provide the student with the necessary background to undertake such courses as biopharmaceutics and clinical pharmacy. 12 hours.

421. INTRODUCTION TO INSTITUTIONAL PHARMACY (2 + 0). Professional services, concepts, standards of practice and roles of the pharmacist in contemporary hospitals and related institutions. Prerequisite: Consent of instructor. 2 hours.

431. HISTORY OF PHARMACY (3 + 0). The educational, organizational and professional growth and development of pharmacy in Western Europe and North America. 3 hours.

441.* INTRODUCTION TO RADIOACTIVE PHARMACEUTICALS (2 + 2). A survey course in the types of radiation, methods of detection and measurement and the application of radioisotopes to modern health care. Emphasis in the laboratory will be on the safe storage, handling and control of radioactive material. Prerequisite: Consent of instructor. Offered Fall Quarter. 3 hours.
501, 502, 503. PRESCRIPTION PRACTICE (3 + 4). The procedures involved in filling a prescription; includes extemporaneous techniques with emphasis in areas of major importance; ophthalmic, otic and nasal solutions, dermatological preparations and special solutions. Family health records are maintained throughout the course with a view toward predicting possible drug interactions. The most commonly utilized prescription and non-prescription medications are discussed as therapeutic classes and as individual formulations. The laboratory is divided so that there is a two hour compounding session weekly and a two hour discussion session weekly. Prerequisite: Pharmacy 323, Chemical Pharmacology 413. 12 hours.

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

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

530.* MANUFACTURING PHARMACY (1 + 6). The formulation and fabrication by mechanized methods of a variety of pharmaceutical dosage forms. Prerequisite: Consent of instructor. Offered Fall and Winter Quarters. 3 hours.

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

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

560.* CLINICAL PHARMACY 1 (0 + 9). Introduction to Clinical Pharmacy; Course consists of experience in area hospitals, with view to introducing the student to health care delivery and drug disease relationships. During the course the student will be given the opportunity to see the application of principles discussed in other courses. Transportation is arranged by the student. Prerequisite: P-4 standing. Offered each quarter. 3 hours.

570.* ADVANCED INSTITUTIONAL PHARMACY (2 + 0). A study of the organization and management of contemporary hospitals and the interrelationship of the pharmacy department to the hospital structure. Prerequisites: Pharmacy 421 and consent of instructor. Offered Spring Quarter. 2 hours.
DEPARTMENT OF
PHARMACEUTICAL CHEMISTRY
(Department 302)

PROFESSOR STUART; ASSOCIATE PROFESSOR STEWART; ASSISTANT PROFESSOR SUFFNESS

341. BIOCHEMISTRY (4 + 0). The chemistry of carbohydrates, fats, proteins, nucleic acids and enzymes and the metabolism of carbohydrates. Prerequisite: Chemistry 233. 3 hours

342. BIOCHEMISTRY (4 + 0). A continuation of Pharmaceutical Chemistry 341. Metabolism of fats, proteins and nucleic acids, the chemistry of blood, respiration, diuresis and diuretics, vitamins and hormones. Prerequisite: Pharmaceutical Chemistry 341. 3 hours.

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

353.* INTRODUCTORY INSTRUMENTAL ANALYSIS (3 + 3). Instruments used in qualitative, quantitative and control analysis. Prerequisite: Pharmaceutical Chemistry 352. 4 hours.

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

DEPARTMENT OF PHARMACOLOGY
(Department 303)

ASSOCIATE PROFESSOR STEWART; ASSISTANT PROFESSORS BHATTACHARYA, GOssel; LECTURER SHERRIN

133. PHARMACOLOGY (3 + 0). An introductory course designed for students of nursing. Primary emphasis is based on pharmacodynamic principles and pharmacotherapeutics of currently useful medicinal agents. Spring quarter. Prerequisite: Biology 232. 3 hours.

411. CHEMICAL PHARMACOLOGY (3 + 3). Principles involving the chemistry and general pharmacodynamics as well as integration of the concepts of structure-activity-relationships, absorption, distribution, binding, biotransformation and elimination of drugs from natural and synthetic origin. Prerequisites: Physiology 333 and Pharmaceutical Chemistry 342, or departmental approval. 4 hours.

412. CHEMICAL PHARMACOLOGY (3 + 3). A continuation of Chemical Pharmacology 411. Examination of the chemistry, pharmacology and therapeutics of medicinal agents active on the autonomic nervous system. Prerequisite: Chemical Pharmacology 411. 4 hours.
413. CHEMICAL PHARMACOLOGY (3 + 3). A continuation of Chemical Pharmacology 412. Examination of the chemistry, pharmacology and therapeutics of medicinal agents active on the central nervous system, including contemporary drugs of abuse. Prerequisite: Chemical Pharmacology 411. 4 hours.

453. INTRODUCTION TO DISEASE (3 + 0). An introductory study of the underlying principles concerning the etiology of disease; through an understanding of the disturbances; and the methods in which they express themselves as symptoms and signs. Prerequisite: Permission of instructor. 3 hours.

511. CHEMICAL PHARMACOLOGY (3 + 0). A continuation of Chemical Pharmacology 413. Examination of the chemistry, pharmacology and therapeutics of medicinal agents active as analgesics and antipyretics, as well as cardiovascular and renal pharmacotherapeutics. Prerequisite: Chemical Pharmacology 411. 3 hours.

512. CHEMICAL PHARMACOLOGY (3 + 0). A continuation of Chemical Pharmacology 511. Examination of the chemistry, pharmacology and therapeutics of medicinal agents derived from endocrine sources, or active on endocrine tissue. Prerequisite: Chemical Pharmacology 411. 3 hours.

513. CHEMICAL PHARMACOLOGY (3 + 0). A continuation of Chemical Pharmacology 512. Examination of potential toxicological properties of medicinal agents and various environmental factors. Emphasis on correlating chemical activity in the human with biological and environmental forces that may alter the chemical's normal response. Prerequisite: Chemical Pharmacology 411. 3 hours.

550.* PHARMACOLOGICAL PROBLEMS (0 + 3, 0 + 6, or 0 + 9). Research to acquaint the student with literature searching, experimental design, experimental methods and techniques, data analysis, and scientific reporting in pharmacology. Fall, winter, and spring quarters. Prerequisites: Chemical Pharmacology 413 and departmental approval. 103 hours.

DEPARTMENT OF PHARMACOGNOSY AND NATURAL PRODUCTS
(Department 304)

PROFESSOR AWAD (Chairman); ASSISTANT PROFESSOR SUFFNESS

321. GENERAL PHARMACOGNOSY (3 + 3). An orientation in the field of Pharmacognosy; covering history, modern trends, nomenclature, classification, identification, and evaluation of certain drugs of biological origin. It deals with background information on drugs of carbohydrate, protein, lipid, ethereal, and resinous nature necessary for a more adequate understanding of subjects taught in the course sequence on pharmaceutical preparations. Prerequisite: Organic Chemistry 233 and Biology 113. 4 hours.
331.* MARINE PHARMACOGNOSY (3 + 0). An introduction to the study of natural products obtained from marine plants and animals. The course covers a survey of the taxonomy of biomedically interesting marine organisms as well as the chemical nature and biological activities of their major constituents. Prerequisite: Biology 223 and departmental approval. To be offered in the fall. 3 hours.

432. BIOMEDICINALS FROM NATURAL SOURCES (3 + 3). A study of the biological aspects of natural products used as important pharmaceuticals. Emphasis is placed on alkaloids, glycosides and certain other biomedicinals, their fundamental properties and methods of isolation. Prerequisites: Biochemistry 342 and Pharmacognosy 321. 4 hours.

433. ANTIBIOTICS AND BIOLOGICALS (3 + 0). A team-taught, integrated course which deals with the concept of antibiosis, theory and principle of immunology as well as the production, chemistry, biosynthesis and pharmacology of the major antibiotic agents of therapeutic and pharmaceutical use. Emphasis is placed on biologics currently recommended by the Public Health Service Advisory on Immunization Practice in the United States. Prerequisite: Microbiology 362. 3 hours.

441.* MEDICINAL PLANT PROPAGATION AND CULTIVATION (1 + 3). Propagation, cultivation, collection, preservation, screening, planning and development of a medicinal garden. Field trips. Prerequisite: Departmental approval. To be offered in the Spring term. 3 hours.

541.* THE ORGANIC CONSTITUENTS OF MEDICINAL HIGHER PLANTS (3 + 0). Chemistry and interrelationships of constituents obtained from pharmacogynostical plants; outline of the methods of isolation, purification, identification and structure determination. Prerequisite: Departmental approval. To be offered in Fall term. 3 hours.

542.* BIOGENESIS OF NATURAL PRODUCTS (3 + 0). An outline with discussion and study of research involving biosynthesis of compounds of pharmaceutical interest. Prerequisite: Departmental approval. To be offered in Winter term. 3 hours.

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

DEPARTMENT OF PHARMACEUTICAL ADMINISTRATION
(Department 305)

ASSISTANT PROFESSOR PREVITE (Chairman).

550. PHARMACEUTICAL ADMINISTRATION PROBLEMS (10 + 3, 0 + 6, or 0 + 9). Research problems in pharmaceutical administration. Laboratory work employing some of the modern techniques available in pharmaceutical administration, including the application of basic principles to graduate study and research in pharmaceutical administration. Prerequisite: Departmental approval. 1-3 hours.
551. PHARMACEUTICAL LAW (4 + 0). A study of professional ethics and the philosophy, requirements, administration, and enforcement of local, state, and federal laws related to the practice of the profession of pharmacy. 4 hours.

552.* PHARMACEUTICAL MARKETING (3 + 0). Fact, considerations, and principles which underlie the flow of drug products, and the availability or use of pharmaceutical and other professional services from production to consumption. Principal economic, legislative, and social forces affecting the health-care industry are discussed, and resulting policies and procedures are appraised. Prerequisite: Pharmaceutical Administration 551. 3 hours.

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

DEPARTMENT OF MICROBIOLOGY
(Department 306)

PROFESSOR MALLIN (Chairman)

361. MICROBIOLOGY (3 + 3). Fundamentals of general microbiology and a general survey of techniques and principles pertaining to bacteria, yeasts, molds, viruses and rickettsia. Emphasis is placed on the cell and its metabolites including the production of antibiotics, toxins, and other biological products. Prerequisite: one year of general biology, or botany-zoology, Biochemistry 342. 4 hours.

362. MICROBIOLOGY II (2 + 0). A continuation of Microbiology I with emphasis being placed on biological aspects including a detailed consideration of the host-pathogen relationship. Bacterial pathogens are considered from the standpoint of diagnosis, disease, and treatment. Prerequisite: Microbiology 361. 2 hours.

363.* MEDICAL MICROBIOLOGY (2 + 0). A continuation of Microbiology 362 emphasizing current views on the host-parasite relationship. Prerequisite: Microbiology 361 and 362 and consent of instructor. 2 hours.

462.* VIROLOGY (2 + 0). A comprehensive coverage of the virus-host relation—from the viewpoint of molecular biology. Model systems will be discussed utilizing the bacteriophage. Wherever possible the use of current film material will be introduced. Prerequisite: Biochemistry, Microbiology 361 and 362 and consent of the instructor. 2 hours.

502. PRINCIPLES AND PRACTICES OF PUBLIC HEALTH (3 + 0). Individual and community aspects of the public hygiene, including infections, epidemiology, prophylaxis, and a discussion of the major types of illness (nutritional, metabolic, mental, environmental, occupational). Prerequisites: Microbiology, 361, 362. 3 hours.

550.* MICROBIOLOGY PROBLEMS (0 + 3, 0 + 6, 0 + 9). Documentation, manipulative, and intellectual skills of investigation in the biologic science areas of interest in pharmacy. Prerequisite: Microbiology 362 and consent of instructor. 1-3 hours.
In addition to the college whose courses are listed in this catalog, Ohio Northern University also maintains a College of Law on its campus. This college is accredited by the American Bar Association and is a member of the League of Ohio Law Schools and the Association of American Law Schools. It offers a three-year program leading to the degree of Juris Doctor. Its graduates are eligible to take the bar examination in all of these states by virtue of its accreditation by the American Bar Association.

The College of Law requires that all entrants have a Bachelor's degree. Inquiries concerning eligibility for admission and requests for the Law School catalog should be directed to the Dean of the College of Law.
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JOHN E. GLENN, B.A. (Wooster), Ph.D. (Pittsburgh), 1970, Assistant Professor of Physics

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THOMAS L. GORDON, B.F.A., M.F.A. (Ohio U.), 1966, Chairman, Department of Art; Associate Professor of Art

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

HOWARD L. HAIGHT, B.S., M.S. (Nebraska), Ph.D. (Iowa), 1968, Associate Professor of Chemistry

MARY KATHARINE HAMMOND, B.A. (Swarthmore), M.A. (Delaware), 1963, Assistant Professor of History and Political Science

EUGENE N. HANSON, A.B. (Luther), A.M., J.D. (Wisconsin), LL.M. (Michigan), 1947, Dean, College of Law; Professor of Law
KATIE LOU HANSON, A.B., A.M. (South Carolina), Ed.D. (Columbia), 1948, Professor of Education (Leave of Absence)

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

BYRON L. HAWBECKER, B.A. (Manchester), M.S. (Arizona), Ph.D. (Kent State), 1963, Associate Professor of Chemistry

GEORGE A. HENLEIN, B.S. (St. Mary's Col., Minnesota), M.S. (DePaul U.), Ph.D. (Michigan), 1970, Director of Institutional Research with rank of Assistant Professor

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

HAROLD H. HINDERLITER, A.B. (Houghton), S.T.B. (Wesley Theological Sem.), Ph.D. (Vanderbilt), 1960, Professor of Philosophy and Religion; Chairman, Department of Philosophy and Religion

FLOYD W. HOCH, B.S.Ed. (Ohio Northern), M.A. (Bowling Green), 1961, Associate Professor of Biology

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