The Institute of Agriculture traces its history to 1869 when the University was designated as Tennessee’s Federal Land-Grant Institution. Under terms of the Federal Land-Grant Act, the University was enabled to offer instruction in agriculture and the mechanic arts for the first time. Since 1869, agricultural programs at the University have expanded to include research for the development of new knowledge and extension for dissemination of such knowledge to rural people. Thus the Institute of Agriculture has come to include the work of three main divisions: Agricultural Experiment Station, Agricultural Extension Service, and College of Agriculture.

In March 1974 the College of Veterinary Medicine was established within the Institute. The college is developing research and graduate programs in veterinary medical sciences in addition to the professional curriculum leading to the degree, Doctor of Veterinary Medicine. The first students were admitted in the fall of 1976.

Agricultural Experiment Station

D. M. Gossett, Dean
T. J. Whatley, Associate Dean
J. I. Sewell, Assistant Dean

The Agricultural Experiment Station was established by the University’s Board of Trustees on June 8, 1882, five years before the passage of the Hatch Experiment Station Act by the U.S. Congress. The University was one of the first five institutions in the U.S. to establish an Agricultural Experiment Station. Since its beginning the Station has given first attention to investigations of concern to the agriculture of Tennessee. The investigations of the Station follow a systematic method of gaining and applying knowledge efficiently to the biological, physical, and economic phases of producing, processing, and distributing farm and forest products; to the social and economic aspects of rural living; and to consumer health and nutrition. Both farm and urban populations gain from the accomplishments of the Agricultural Experiment Station. Examples of some of these accomplishments are new and improved varieties of crops, new and better methods of controlling crop and livestock pests, more efficient production of crops and pasture through improved fertilization and mechanization, and more efficient feeding and management of livestock.

The program is designed and administered through sixteen subject matter departments located at Knoxville. A number of the staff have teaching responsibilities in addition to their research. To assist in the research program the Station supports a large number of graduate students. To serve Tennessee’s diverse agriculture, branch stations are operated at Jackson, Spring Hill, Springfield, Lewisburg, Crossville, Greeneville, and Martin. In addition, field stations are operated at Grand Junction, Milan, Wartburg, Tullahoma, and near Chattanooga. Professional and technical staff are in residence at these locations.

The UT-DOE Comparative Animal Research Laboratory is located about twenty miles west of Knoxville near Oak Ridge, where a program of radiobiological research in the field of agriculture is carried out by the Agricultural Experiment Station under contract to the Department of Energy. The program includes research with farm and laboratory animals, with soils, and in applied radiobotany and plant breeding.

Agricultural Extension Service

M. L. Downen, Dean
T. W. Hinton, Associate Dean
B. G. Hicks, Assistant to the Dean
M. F. Clarke, Assistant Dean

The Agricultural Extension Service was established in 1914. Its purpose is to extend through various educational means agricultural and home economics information to farm families and others in the state who do not have the opportunity to enroll in resident courses of instruction at colleges.

The educational program is carried on through offices in each of the ninety-five counties of the state. Education emphasis includes work in four major program areas: agriculture and natural resources, community resource development, home economics, and education of young people through 4-H Clubs. County Extension staff members working directly with local people are supported in the various information fields by a specialist staff, members of which are stationed either in Knoxville, Nashville, or Jackson. The Agricultural Extension Service operates administratively as one of four units of the Institute of Agriculture. For administration the state is divided into five districts with supervisors located in their respective districts. District headquarters are maintained in Knoxville, Chattanooga, Cookeville, Nashville, and Jackson.

The Agricultural Extension Service operates as a three-way partnership among county, state, and federal governments. The University of Tennessee represents state and federal government and a County Agricultural Extension Committee represents county government in this partnership.

College of Agriculture

O. Glen Hall, Dean

Graduate programs of the College of
Agriculture are designed to prepare men and women for positions of leadership in industry, state and federal government, teaching, research, and extension. The graduate student is expected to demonstrate a thorough knowledge of the subject matter in his/her specialized field of study and its relationship to the sociological, economic, and environmental impact on society. The student must demonstrate the ability to plan, conduct, analyze, and report original research. More importantly, emphasis is given to intellectual development and to the development of scholarly habits of study, reasoning and analysis to the end that the graduate will continue to grow and develop professionally throughout his/her career.

MASTER OF SCIENCE PROGRAMS

Programs of graduate study leading to the Master of Science degree are offered through all departments in the College of Agriculture. The general rules of the Graduate School apply to all graduate work in this college. The graduate program may be entirely in one major subject or may include one or two minors in any of the subject matter areas related to the major. Both majors and minors are available in Agricultural Biology, Agricultural Economics, Agricultural Engineering, Agricultural Extension, Agricultural Mechanization, Animal Science, Food Technology and Science, Ornamental Horticulture and Landscape Design, and Plant and Soil Science. Majors only are available in Forestry and Wildlife and Fisheries Science, and minors are available in General Agriculture and Rural Sociology. The minor in General Agriculture requires 18 hours of course work. A complete listing of majors is shown on pages 8-9.

For admission to a graduate degree program, the student must have a satisfactory academic average and have completed all the substantial requirements for an undergraduate major in his/her field of study or have completed sufficient undergraduate work in related areas to satisfy the department that he/she can successfully pursue graduate study in the chosen field. Prerequisite courses may be required when the student's preparation is deemed to be inadequate.

Each program of course work and thesis research is planned by the major professor and Master's committee in consultation with the student and will depend upon the student’s background, interests, and professional objectives. For example, a student majoring in Agricultural Biology may pursue work with an emphasis either in the area of plant pathology or economic entomology.

Normally, graduate programs will include the thesis requirement. There is, however, a non-thesis option in the Department of Agricultural Economics and Rural Sociology in addition to the thesis option that has the following minimum requirements: 48 hours of course work of which 24 hours must be at the 5000-level; 18 hours in agricultural economics; 9 hours of economic theory; 6 hours in quantitative methods in agricultural economics, statistics, or mathematical economics; final comprehensive written and oral examination.

DOCTORAL PROGRAMS

Graduate study programs leading to the Doctor of Philosophy degree in Animal Science, Agricultural Economics, Agricultural Engineering, and Plant and Soil Science are offered in the College.

General Graduate School requirements relative to admission, faculty advisory committees, residence, grades, research, and admission candidacy for degree are to apply to all doctoral programs. Special departmental requirements are listed in the following paragraphs.

Agricultural Economics and Rural Sociology

Subject Area Requirements: All candidates pursuing the Doctor of Philosophy degree will be required to demonstrate competence in examinations in the following areas:

A. A major area of concentration to be selected from the following:

1. Agricultural policy
2. Agricultural marketing and price analysis
3. Farm management and production economics
4. Natural resource economics
5. Rural development

B. The core areas:

1. Agricultural economics
2. Economic theory
3. Mathematical and quantitative methods in agricultural economics

Course Requirements: A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for Master's research, is required in the doctoral program. Of this total, 36 hours in doctoral research and dissertation are required. At least 30 hours of course work shall be in agricultural economics and 15 hours in economics. Excluding the dissertation, a minimum of 21 hours in agricultural economics and 36 hours in agricultural economics and economics combined must be in courses numbered 5000 and above.

Agricultural Engineering

Candidates pursuing the Doctor of Philosophy degree in Agricultural Engineering may specialize in one of the following areas:

1. Agricultural power and machinery
2. Soil and water conservation engineering
3. Agricultural structures
4. Electric power and processing

Supporting studies are required in related biological, physical, and engineering sciences and mathematics fundamental to the training of the candidate.

Additional course requirements for the degree of Doctor of Philosophy in Agricultural Engineering are:

1. Minimum of 108 quarter hours credit in courses beyond the Bachelor’s degree, exclusive of credit for the Master’s thesis. Of this number, students are required to complete a minimum of 36 quarter hours in Doctoral Research and Dissertation.
2. At least 36 quarter hours credit in courses numbered 5000 and 6000, exclusive of Doctoral Research and Dissertation.
3. A minimum of 24 quarter hours credit must be completed in related fields outside of animal science.

The specific program of a candidate for the degree of Doctor of Philosophy in Animal Science depends upon the interest and previous training of the candidate. Actual course content of the program is planned with each student in consultation with a faculty advisory committee to meet requirements in the various areas of concentration.

Plant and Soil Science

The Department of Plant and Soil Science offers programs leading to the Doctor of Philosophy degree in the following areas of specialization:

1. Soils
2. Plant breeding and genetics
3. Crop physiology and ecology

Supporting studies are required in related sciences fundamental to the training of the candidate.

Some of the specific requirements for the degree are:

1. Minimum of 108 quarter hours credit beyond the Bachelor’s degree exclusive
of Master’s. Of this number, students are required to complete a minimum of 36 quarter hours in Doctoral Research and Dissertation.

2. Minimum of 30 quarter hours credit in courses numbered 5000 and 6000 exclusive of Doctoral Research and Dissertation in the Department.

A specific program of a candidate for the degree of Doctor of Philosophy in Plant and Soil Science will depend upon the interest and previous training of the candidate. The program of courses and research will be planned with the student in consultation with a faculty advisory committee. The major professor will serve as chairperson of the faculty advisory committee and will direct the research and the preparation of the dissertation.

Departments of Instruction

Numbers in parentheses following the course titles indicate quarter hours credit offered.

Agricultural Biology

MAJOR

Agricultural Biology

DEGREE

M.S.

Professors:

G. C. Southards (Head), Ph.D. North Carolina State; J. W. Hilly, Ph.D. Ohio State; J. F. Jones, Ph.D. Louisiana State.

Associate Professors:

R. Gerhardt, Ph.D. North Carolina State; P. L. Lambdin, Ph.D. Virginia Polytechnic Institute; C. D. Plesk, Ph.D. Clemson; H. E. Reed, Ph.D. Ohio State.

Assistant Professor:

E. C. Bernard, Ph.D. Georgia.

3130 Introductory Plant Pathology (4) Principles of plant pathology illustrated by diseases of common agricultural crops. Prereq: Introductory botany or zoology. Graduate credit for non-majors only. (Same as Botany 3130.) 3 hrs and 1 lab.

3210 Economic Entomology (4) Structure, life histories and habits of control of important insect pests of farm, garden, orchard, and household. 3 hrs and 1 lab.

3220 Apiculture (3) Biology of the honey bee, with emphasis on beekeeping equipment and apiary management. Practices relative to pollination of crops and production of honey and beeswax. 2 hrs and 1 lab.

4010 Biology of Soil Microorganisms (4) Morphology and physiology of soil organisms, decomposition of organic matter, chemical transformations, and interactions between soil organisms and higher plants. Prereq: Introductory microbiology or 3130. 3 hrs and 1 lab.

4030 Forest and Shade Tree Entomology (3) Identification, biology, ecology, and control of forest and shade tree pests. Prereq: 3210 or equivalent. 2 hrs and 1 lab.

5000 Thesis

5010 Research Methods and Instrumentation in Plant Pathology and Entomology (3) Techniques for laboratory, field, and greenhouse research in plant pathology and entomology. 1 hr and 2 labs.

5210 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, and ecology of plant parasitic nematodes with emphasis on host-parasite relationships. Prereq: 8 hrs biological science or consent of instructor. (Same as Zoology 5210.) 2 hrs and 2 labs.

5220 Plant Disease Control (3) Basic problems and principles involved in controlling plant diseases. Prereq: 3210.

5230 Field Crop and Vegetable Insects (3) Taxonomy, biology, and control of insects affecting field and vegetable crops. Prereq: 3210 or equivalent course in applied entomology. 2 hrs and 1 lab.

5250 Medical and Veterinary Entomology (4) Morphology, taxonomy, biology, and control of arthropod parasites and vectors of pathogens of humans and domestic and wild animals. Vectors in relation to pathogen transmission and control. Prereq: 3210, general entomology, or consent of instructor. 3 hrs and 1 lab.

5260 Insect Pest Management (4) Principles and applications of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest populations below economic threshold levels. Prereq: 3210, Zoology 3110, or consent of instructor. 3 hrs and 1 lab.

5310 Special Problems in Plant Pathology or Economic Entomology (1-6) Comprehensive individual study of current problems in economic entomology or plant pathology. May be repeated. Maximum 9 hrs.

5410 Seminar (1) Review of literature and current research in entomology or economic entomology. May be repeated. Maximum 3 hrs.

Agricultural Economics and Rural Sociology

MAJOR

Agricultural Economics

DEGREES

M.S., Ph.D.

Professors:

J. A. Martin (Head), Ph.D. Minnesota; M. B. Badenhop, Ph.D. Purdue; J. W. Brown, Ph.D. Iowa State; C. L. Cleland, Ph.D. Wisconsin; J. Dubov, Ph.D. California (Berkeley); H. Keller, Ph.D. Kentucky; F. O. Leuthold, Ph.D. Wisconsin; B. R. Manus, Ph.D. Purdue; B. H. Penncost, J.D., Tennessee; C. B. Sappington, Ph.D. Illinois.

Associate Professors:


Assistant Professor:

R. H. Orr, Ph.D. Illinois.

The Department has programs for the Doctor of Philosophy degree and the Master of Science degree with a thesis or non-thesis option.

Agricultural Economics

4120 Farm Management (3) Principles of farm organization and operation; allocation of land, labor, and capital to meet changing technologies; tenure arrangements and use of credit; risks; measures of success. Use and analysis of records; exercises in planning farms. Field trips arranged. Prereq: Agricultural Economics 1110 and Economics 2120. 2 hrs and 1 lab.

4140 Introduction to Agricultural Production Economics (3) Resource allocation, product selection, scale of operation of agricultural firms; aggregate effects of decisions made by individual agricultural firms. Prereq: Agricultural Economics 1110 and Economics 2120. 2 hrs and 1 lab.

4240 World Agriculture and Trade (3) Economic bases of world agricultural products and trade; resource location, land tenure systems, international trade and commercial policy. Prereq: Agricultural Economics 1110 and Economics 2120, or consent of instructor.

4250 Agricultural and Rural Planning (3) Decision-making concepts applied to design and implementation of rural action programs. Case examples from the U.S. and other countries.

5310 Special Problems in Plant Pathology or Economic Entomology (1-6) Comprehensive individual study of current problems in economic entomology or plant pathology. May be repeated. Maximum 9 hrs.

5410 Seminar (1) Review of literature and current research in entomology or economic entomology. May be repeated. Maximum 3 hrs.

5420 Agricultural Finance (3) Nature and source of capital, credit problems of farmers; kinds and sources of farm credit. Agricultural insurance and taxation. Prereq: Agricultural Economics 1110 and Economics 2120.

5430 Agricultural Policies (3) Meaning of agricultural policy and its impact on the environment; relationship of farm groups to public policy; problems giving rise to policy; agricultural policy and appraisal of regulatory problems. Prereq: Agricultural Economics 1110 and Economics 2120.

5430 Land Economics (3) Problems and policies of land use, conservation, development, taxation, and tenure; population growth and demand for land; principles and theories of rent, property, value, and income. Prereq: Agricultural Economics and Economics 2120.

5460 Management of Farm Supply and Marketing Firms (3) Operation of firms selling farm supplies and merchandising agricultural products. Emphasis on accounting data and economic theories for decision making. Prereq: Agricultural Economics 1110 and Economics 2120.


710 Agricultural Law (4) Survey of law and application to the farmer, his family and agricultural industry. Property, contracts, torts, drainage and water rights, landlord-tenant relationships, taxation and insurance, forms of business organization, estate planning, regulatory laws, and other selected topics.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5101 Special Problems in Lieu of Thesis (3)

5120 Agricultural Price Analysis (3) Analysis and interpretation of factors affecting agricultural prices; price indices and cycles; prediction of economic theory and statistical techniques to agricultural price data. Prereq: 5120 and Economics 3120. 3 hrs and Statistics 4310 or equivalent.

5130 Advanced Agricultural Production Economics (3) Theory and empirical concepts of agricultural resource allocation problems under conditions of uncertainty. Prereq: 4140 or equivalent.

5120 Seminar: Agricultural Policies (3)

5220 Seminar: Methodology of Research (3)

5230 Seminar: Adjustments to Industrialization (3)

5310 Research (3) Special research projects in agricultural economics and rural sociology. Gathering, tabulating and interpreting data and reporting. May be repeated. Maximum 9 hrs. S/NC only.

5410 Agricultural Marketing Analysis (3) Application of tools of economic analysis to the study of specific marketing problems at all levels of marketing systems for agricultural commodities. Prereq: 4650 or equivalent.

5420 Advanced Land Economics (3) Problems in land tenure, land use, and conservation in United States and selected foreign countries. Prereq: 4530 or equivalent.

5440 The Economics of Agricultural Development (3) Role of agriculture in overall economic development; economic nature of traditional agriculture; and analysis of causal forces and structural interdependences. Prereq: 4250 or consent of instructor.
5610 Quantitative Methods in Agricultural Economics (3) Analytical techniques useful in estimation of functions—supply, demand and production—and prediction of economic variables. Emphasis on application of multiple regression model specification, estimation technique using computer and interpretation of results. Prereq: Statistics 4310 or Economics 5510 or consent of instructor.

5710 Quantitative Methods in Agricultural Economics (3) Linear programming technique with emphasis on applications made to problems of maximizing profit, minimizing cost, firm growth, decision-making, and matrix theory and nonlinear programming. Prereq: Economics 4180 or consent of instructor.

6000 Doctoral Research and Dissertation (9) Topics selected, from the areas of economics of production, consumption or distribution in agriculture and related industries and public policies concerned with agriculture and related industries.

6210 Agricultural and Rural Transformation Problems (3) Systematic evaluation of policy and development proposals related to agricultural modernization, food supply, and rural living. Decisions faced by rural communities and role of social scientists. Analysis of current issues in U.S. and developing nations. Prereq: Consent of instructor.

6410 Agricultural Supply Analysis (3) Estimating agricultural supply relationships using aggregative time series regression, production functions, linear programming, and firm growth models with emphasis on correspondence between theoretical concepts and model attributes. Prereq: 5130 or consent of instructor.

6420 Marketing and Resource Use (3) Institutional settings for research and policy formulation. Analytical tools to measure efficiencies of marketing and resource use. Emergent problems in market and resource use. Waste and management in marketing systems to conserve resources and environment. Prereq: 5410 or consent of instructor.

Rural Sociology

3420 Rural Sociology (3) Nature of rural society; social systems concept; rural-urban differences; nature of social relations; population characteristics and movement; problems of rural people; tenure; farm services; educational facilities, churches, local government; impact of urbanization.

4450 Diffusion of Agricultural Technology (3) Analysis of diffusion process whereby new technology becomes a part of the technology base of farmers to final adoptions. Topics discussed include the adoption process, communication behavior, various mass media roles, professional change agents, opinion leadership, and two-step flow hypothesis. Prereq: 3420 or instructor.

5430 Special Problems (3) Special topics in rural sociology. Prereq: 3420 or consent of instructor. May be repeated. Maximum 9 hrs. S/N only.

5430 Seminar in Rural Sociology (3) Current rural sociological literature and research; relevance of general sociological theory and methodology. Prereq: 3420 or equivalent.

5450 Advanced Rural Sociology (3) Application of sociological concepts to analyze changing structure and function of rural; change, conflict, mobility, attitudes, and norms as they influence the family, formal and informal groups, population shifts and changing farm technology. Prereq: 3420 or equivalent.

5470 Research Problems in Rural Communities (3) Emphasis on problems that arise in survey research in rural areas. Sampling procedures, questionnaire design, interview scheduling, training, control, and legitimation needs are covered. Prereq: Undergraduate course in statistics.

5490 Rural Population Analysis (3) Analysis of U.S. and world population changes and determinants of fertility, mortality, and migration with emphasis upon changes in rural sector. Prereq: Sociology 4110 or equivalent.

Agricultural Engineering

MAJORS

DEGREES

Agricultural Engineering
M.S., Ph.D.

Agricultural Mechanization
M.S.

Professors:

D. H. Luttrel (Head), Ph.D., Iowa State; H. O. Vail (Assoc. Head), Ph.D., Iowa State; G. L. File (Other Directors); same theory and nonlinear programming. Prereq: Economics 4180 or consent of instructor.

3410-20 Selected Topics in Agricultural Engineering (3) Develop new topics as required by current trends and problems in agricultural engineering.

4610 Design of Water Control and Waste Utilization Systems (3) Design of water control and waste utilization systems including earth dams, irrigation, drainage, land grading, hydraulic transport, waterworks, and application of wastes on agricultural land. Prereq: 3610 or consent of instructor. 1 hr and 2 labs.

4620 Design of Structures for Production, Processing, and Environmental Control (3) Functional and structural design of agricultural buildings; emphasis placed on complete design of structure or system; design to include functional, structural, and environmental aspects. Prereq: 3620. 1 hr and 2 labs.

4630 Design of Processing and Materials Handling Systems (3) Development of systems and components for integrated agricultural processing considering mass and energy balances, production characteristics, equipment specifications, storage, handling and economic merit. Prereq: 3630. 1 hr and 2 labs.

4640 Design of Agricultural Machinery (3) Functional requirements of agricultural machinery. Elements of design, including selection of design; synthesis of mechanisms, mechanical and hydraulic drives. Team effort in completing machine design project. Prereq: 3640 or consent of instructor. 1 hr and 2 labs.

5000 Thesis

5240 Environmental Control in Agricultural Structures (3) Engineering analysis of factors related to processes of animal and plant life; systems for development and design of facilities and structures for confined housing of animals, controlled environment for plant growth, and storage facilities for plant and animal products. Prereq: Agricultural Mechanization 3220, Mechanical Engineering 3110, or consent of instructor. 2 hrs and 1 lab.

5340 Hydrology of Agricultural and Forest Lands (3) Analytical approach to problems involving water supply, deficiency, and time distribution as related to agricultural and forestal purposes. Prereq: 3610, Introductory Hydrology; Forestry 4030, or consent of instructor. 2 hrs and 1 lab.

5440 Instrumentation in Agricultural Systems (3) Analysis of specific instrumentation needs in agricultural industry and research problems; principles and utilization of specialized instrumentation. Prereq: Engineering electronics or consent of instructor. 2 hrs and 1 lab.

5540 Engineering Properties of Agricultural Materials and Products (3) Fundamental properties of agricultural products and materials related to handling, processing, and utilization. Prereq: Processing and materials handling systems and Engineering Science and Mechanics 3130. 1 hr and 2 labs.

5640 Research Problems in Agricultural Engineering (3) Theoretical and experimental studies relating to current problems in agricultural engineering. May be repeated. Maximum 9 hrs.

5710-20 Similitude in Design and Research (3, 3) Dimensional analysis in development of models; theory and types of models, prediction equations, interpretation of data; applications to machinery, soil and water structures, agricultural buildings, and other agricultural engineering-related problems. Prereq: Engineering Science and Mechanics 3130 and 3311. 2 hrs and 1 lab.

6000 Doctoral Research and Dissertation (9) Topics selected, from the areas of economics of production, consumption or distribution in agriculture and related industries and public policies concerned with agriculture and related industries.

6110 Seminar (1) Current research and literature related to engineering in agriculture. May be repeated. Maximum 3 hrs.

6170 Small Engines (3) Concepts and mechanics of small gasoline engines; selection, operation, adjustment, and repair of single cylinder engines. 2 hrs and 1 lab.

6180 Equipment and Techniques for Application of Agricultural Chemicals (3) Equipment for application of liquid, solid, and gaseous chemicals; system components; operational characteristics; safety considerations; calibration; selection and management; materials handling and disposal methods. 2 hrs and 1 lab.

6210 Agricultural and Rural Transformation Problems (3) Systematic evaluation of policy and development proposals related to agricultural modernization, food supply, and rural living. Decisions faced by rural communities and role of social scientists. Analysis of current issues in U.S. and developing nations. Prereq: Consent of instructor.

Agricultural Mechanization

4160 Agricultural Waste Utilization and Disposal (3) Techniques, equipment, and structures for utilizing, treating, and disposing of agricultural wastes. 2 hrs and 1 lab.

4700 Agricultural Machinery and Tractors (4) Agricultural machinery and power units; adaptation to agricultural practices; field efficiencies, capacities, advantages and disadvantages. Prereq: Mathematics 1550. 3 hrs and 1 lab.

4710 Electromechanical Systems in Agriculture (3) Integration of electric power, mechanical equipment, structures, and environmental systems to plant and animal production, crop processing, and materials handling. Prereq: 3220 and 3510. 2 hrs and 1 lab.

4720 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery; adaptation planning for sequential operations; machinery for unique and alternate developments in growing systems; operational management. Prereq: 4210. 2 hrs and 1 lab.

4750 Selected Topics in Agricultural Mechanization (3) Lecture, discussion, and individual study on specialized agricultural mechanization developments. May be repeated. Maximum 9 hrs.
Agricultural Extension Education

MAJOR DEGREE
Agricultural Extension M.S.

Professors: R. E. Carver (Head), Ph.D. Pennsylvania State; H. H. Dickson, Ed. D. Cornell.

Associate Professor: C. E. Carter, Jr., Ph.D. Oklahoma State.

3110 Introduction to Agricultural Extension (3) History; philosophy; organization; teaching methods; relationships with other educational agencies. Graduate credit for non-majors only.

4110-20 Field Studies (3, 3) Supervised work experience with county extension agents in a decision-making role. Prereq: 3110 and consent of instructor. Requires living off-campus for a specified time.

5000 Thesis

5100 Special Problems in Agricultural Extension (1-6) May be repeated. Maximum 9 hrs.

5210 Long-range Extension Program Planning (3) Development of county extension program based on effective interpretation of physical, social, economic characteristics of areas. Prereq: 5100 or consent of instructor.

5220 Seminar (3) Review of literature and development of methods of communication. Prereq: 5100 or consent of instructor.

5230 Evaluation in Programs of Agricultural Extension (3) Principles, instruments, and techniques of identifying, gathering, analyzing, and using data to appraise planning and teaching to determine progress of clientele. Prereq: 5210 or consent of instructor.

5310 History, Philosophy and Objectives (3) Historical and philosophical foundation of informal adult education in American agriculture from the agricultural societies (1785 to present). Key figures, failed, legislative, movements, farm organizations, and programs. Emphasis on agricultural extension service, its origin, legislation and growth and nature of present day objectives and programs. Prereq: 3110 or consent of instructor.

5320 Volunteer Leadership in Agricultural Extension Programs (3) Theory, principles and procedures in development of volunteer leadership for small groups in rural communities through agricultural extension programs. Emphasis on analysis and development of potential of volunteer leadership function, techniques of effective leadership in small groups and methods of developing volunteer leaders in traditional and new roles of agricultural extension work. Prereq: 3110 or consent of instructor.

5330 Supervision of Agricultural Extension Programs and Personnel (3) Theories of human effectiveness; principles of successful supervision applied to various parts of county, district and other extension programs; and planning for effective office management. Prereq: 5210 or 5220 or consent of instructor.

Animal Science

MAJOR DEGREE
Animal Science M.S., Ph.D.

Professors: J. W. Melton, Ph.D. Ohio State; M. C. Bell, Ph.D. Oklahoma State; C. C. Chamberlain, Ph.D. Iowa State; H. M. Jamison, Ph.D. Tennessee; J. B. McLaren, Ph.D. Auburn; G. M. Merriman, D.V.M. Michigan State; M. J. Montgomery, Ph.D. Wisconsin; R. L. Murphy, Ph.D. Wisconsin; D. O. Richardson, Ph.D. Ohio State; H. H. Dickson, Ed. D.; R. R. Shrode, Ph.D. Iowa State; E. W. Swanson, Ph.D. Missouri; R. L. Tugwell, Ph.D. Kansas State.


3210 Anatomy and Physiology of Farm Animals (4) Skeletal and joint development, cardiovascular, respiratory, digestive, renal and endocrine systems; demonstrations of physiochemical phenomena. Prereq: Biology 1210 or Agriculture 1130. 3 hrs and 1 lab.

3220 Physiology of Reproduction (3) Comparative anatomy and physiology of reproductive systems of higher vertebrates; gonadotropins, teratogenesis, implantation, prenatal growth, parturition and initiation of lactation; endocrine regulation of reproduction. Prereq: Biology 1210 or Agriculture 1130. 3 hrs and 1 lab.

4210 Physiology of Lactation (3) Development, utilization and deficiency symptoms of essential nutrients; nutritive value determinations and their use. Prereq: Agriculture 1130 and one quarter of organic chemistry.

3330 Feeds and Ration Formulation (4) Feeding practices, nutrient requirements and ration formulation for beef and dairy cattle, sheep, horses, swine, poultry and laboratory animals. Prereq: Agriculture 1130 and one lab. 4 hrs and 2 labs.

3410 Heredity in Animals (3) Basic chromosomal mechanism of heredity with emphasis on Mendelian principles and exceptions such as linkage and cytoplasmic inheritance and the biochemistry of heredity and to quantitative inheritance. Illustrations of principles related to genetics of animal husbandry students. Prereq: Agriculture 1130. 2 hrs and 1 lab.

4240 Principles of Animal Breeding (3) Genetic principles in the breeding of economic species. Emphasis on application of genetics to studies of various kinds of causative differences such as those in genetic makeup and environment. Selection and its consequences. Mating systems and their effects on populations. Prereq: Agriculture 1130. 2 hrs and 1 lab.

5100 Animal Hygiene and Sanitation (4) Parasitic, viral and bacterial organisms in farm animals; prevention and control of swine pest; viral and bacterial and sanitary management of poultry; herd health programs. Prereq: Microbiology 2910-11 or 2910-12 or consent of instructor. 3 hrs and 1 lab.

5210 Physiology of Lactation (3) Development, utilization and deficiency symptoms of essential nutrients; nutritive value determinations and their use. Prereq: Agriculture 1130 and one quarter of organic chemistry.

4340 Experimental Animal Nutrition Laboratory (3) Principles of nutrition, physiology and breeding in a complete beef cattle management program. Topics include structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab.

4350 Light Horse Production and Management (3) History; philosophy; organization; teaching methods and programs; and planning for effective office management. Prereq: 5210 or 5220 or consent of instructor.

4820 Dairy Cattle Production and Management (4) Principles of nutrition, physiology and breeding in a complete dairy cattle management program. Topics include structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab.

4830 Pork Production and Management (4) Principles of nutrition, physiology and breeding in a complete pork production and management program. Topics include structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab.

4840 Poultry Production and Management (4) Structure of poultry industry, organization and management of poultry enterprises including hatching, housing, feeding, processing and marketing. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab.
5420 Advanced Food Quality Assurance (3) Applications of current instrumental methods to control food manufacturing processes. Prereq: 4120, 2 hrs and 1 lab.

5510 Meat Technology (3) Physical and chemical changes that occur during conversion of muscle to meat; the influence these changes have on quality, composition, meat packaging, preservation, and quality control. Prereq: 3840, 2 hrs and 1 lab.

5530 Microorganisms Common in Food Products (3) Identification of desirable and undesirable microorganisms in food products and relationship to manufacturing operations. Isolation and characterization of microorganisms from food products, and plant equipment. Prereq: 4810 or Microbiology 3810, 3 labs.

5540 Microbial Cultures in Foods (3) Physical and chemical environment and metabolism of microorganisms as related to cultured food products. Prereq: 4810 and Microbiology 3810, 2 hrs and 1 lab.

Forestry, Wildlife, and Fisheries

MAJORS

DEGREES

Forestry

Wildlife and Fisheries Science

Professors:

G. Schneider (Head), Ph.D. Michigan State; J. W. Barrett, Ph.D. Syracuse; H. A. Core, Ph.D. Syracuse; E. C. Gurley, Ph.D. North Carolina State; F. W. Woods, Ph.D. Tennessee.

Associate Professors:


Assistant Professors:

W. E. Hammitt, Ph.D. Michigan; R. J. Strange, Ph.D. Oregon State.

Forestry

*3020 Forest Environments and Ecology (3) Environments and ecology of forests and associated biological communities; the application of ecological principles to contemporary problems. Prereq: 8 hrs of biology, botany, or zoology.

*3040 Dendrology and Silvics of Woody Angiosperms (3) Taxonomy, nomenclature, identification, and silvical characteristics of the more common woody angiosperms native to North America. Prereq: Botany 1120. 2 hrs and 1 lab.

*3050 Dendrology and Silvics of Gymnosperms (3) Classification, nomenclature, identification, and silvical characteristics of the major North American conifers. Distribution patterns, habitat, and community relationships including classification, life history, regeneration requirements, place in succession, and importance. Prereq: 8 hrs basic biology or botany. 2 hrs and 1 lab.

*3110 Forest Measurements and Biometry (4) Measurements of individuals in animal and plant populations; linear regression; sampling of forest populations; growth and potential production. Prereq: Plant and Soil Science 3610 and Computer Science 1410 or equivalent. 3 hrs and 1 lab.

*3120 Wood Technology (4) Wood properties; identification of commercial woods by macro and micro characteristics. Prereq: 3040, 3050. 3050 may be taken concurrently. 2 hrs and 2 labs.

*3210 Forest Resource Economics (4) Allocation of forest resources via market and institutional systems. Application of economics to forest resource management; the private and public sector. Prereq: Economics 2120.

*3220 Forest Products and Utilization (3) Harvesting, processing, marketing factors in stand conversion, intermediate and harvest cuts. Prereq: 3120.

3230 Wildlife Management (3) Lives and ecological relationships of wild animals; biological, social, and economic aspects of their management. Prereq: 3120 or Wood and Fisheries Science 3320. 2 hrs and 1 lab.

*3320 Principles of Silviculture (3) Influence of site factors on reproduction, growth, development, and character of forest vegetation; classification of forest structure; silvicultural laws. Prereq: 3020 or Biology 2130, 3040, Plant and Soil Science 2130.

*3730 Conservation (3) Forest resources of state, nation, and world; forests in soil and water conservation; wildlife management and recreation; conservation programs.

4002 Utilization (3) Wood-using industries; processing forest products—sawmills, tree-logging, grading; pulpwood operations, floorings, planting trees; plant layout, flow diagrams. Prereq: 3120.

4003 Field Methods of Timber Inventory (3) Field measurement of timber cruise, determining appropriate sample design for specific purposes; tree and stand growth; site evaluation; field problems. Prereq: 3110 and Agricultural Mechanization 3140.

4004 Forest Practice (3) Management of forest lands by public and private organizations; "multiple-use" concept as it influences management decisions; impact of public pressure for outdoor recreation on management decisions; management problems and cases. Prereq: 3120.

4006 Silvicultural Methods (4) Methods and application of intermediate and regeneration cuttings; site preparation, planting and seeding, modifications of cutting methods to obtain desired goods and benefits. Prereq: 3320, 4002, 4003.

4020 Forest Watershed Management (3) Water as a forest resource; role of forests in the hydrologic cycle, control of water quantity, quality, and time; erosion and deposition. Prereq: 3120 or consent of instructor. Two overnight field trips.

4210 Forestry Organization and Administration (3) Planning, organizing, and leadership concepts and cases; problem analysis and decision making in forest resources management. Prereq: Consent of instructor. Three overnight field trips.

4220 Forest-resource Management (4) The forest as integration of resource uses; review of traditional timber-management concepts; the multiple-use concept; valuation of forest resources for decision making and planning; taxation of forest firm. Prereq: 4210.

4230 Forest-resource Management Plans (4) Field problems and case studies in forest-resource management; the forest as a system; management of forest enterprises as a producer of timber, recreational services, forest products, and wildlife; producing multiple services; preparation of a complete plan based on optimizing forest uses. Prereq: 4210.

4240 Interpreting Forest Resources (3) Principles and techniques for the identification and assessment of the importance of environmental interpretation to management of forest resources; development and administration of interpretive services. Possible overnight field trips required. Prereq: 3240 or equivalent.

4330 Forest Policy (3) History of forestry in United States with emphasis on development of forest resource policies; current policies influencing development and management of forest resources; brief survey of policy implications of forest resource organizations in public and private sectors. Prereq: 3120.

4340 Aerial Photography in Forest-Resource Management (3) Use of conventional aerial photographs in forest-resource management; interpretation of details on aeronautical and topographic maps, interpretation of cover-type maps, uses of other remotely sensed imagery. Prereq: Civil Engineering 4260 and Botany 3110 or equivalent. 1 hr and 2 labs.

4350 Forest Tree Improvement (3) Forest tree improvement relating to silviculture, nature and purposes of tree improvement and forest genetic principles; applications of cytology and population genetics; importance of seed source identification, selection of superior phenotypes and development of seed orchards; hybridization; seed production and seed certification. Prereq: 4006, Botany 1120. 2 hrs and 1 lab.

4340 Regional Silviculture of the United States (3) Factors that influence silviculture management of important tree species in North America; importance of forests and forestry to a region; physiography, geology, soils, climate and weather; silviculture and silvicultural principles of protection, and silvicultural characteristics of the more important species. Prereq: 4006 and 4210.

4440 Forest Recreation (3) Forest lands as a recreation resource; planning, cost and revenue analyses of outdoor recreation and other management activities; development and management of forest recreation areas; socioeconomic and political determinants of recreation development and management. Prereq: 6 hrs sociology and/or economics. 2 hrs and 2 labs.

5000 Thesis

5110 Special Problems in Forestry (1-6) May be repeated. Maximum 9 hrs. Prereq: 3120 or consent of instructor. Two overnight field trips.

5220 Seminar in Forest Tree Biology (3) Growth, reproduction, and physiology of forest trees; forest ecology; variability and taxonomy of forest trees. Prereq: 3320 or Botany 4310.

5230 Seminar in Forest Management (3) Newly developed systems in forest organization and regulation; financial and operational planning in forest management. Prereq: 4230 or equivalent.

5240 Seminar in Forest Genetics (3) Population genetics and specialization; variation patterns and heritability in forest trees; gains with different breeding methods; planning and conducting forest genetics research. Prereq: 4420, Biology 3110, and consent of instructor.

5250 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forest lands; analysis and critique of specific contemporary plans. Overnight field trips may be required. 2 hrs and 1 lab.

5260 Industrial Forestry (3) Structure and analysis of wood-using firms and industries. Forest taxation, land tenure and wood procurement alternatives. Development and application of forestry planning models. Prereq: 4230 or consent of instructor.

5270 Topics in Forest Industries Management (3) Current problems in industrial forestry. Executives from public and private business sector (concerned with forest industry) conduct classes in selected topics. Prereq: 4230 or consent of instructor. Prereq: 4230.

5310 Seminar (1) Current developments in forestry. May be repeated. Maximum 3 hrs. S/NC only.

Wildlife and Fisheries Science

*3230 Wildlife Management (3) Same as Forestry 3320.

4450 Game Mammals (4) Classification, identification, distribution, natural history, and management

*Graduate credit for non-forestry and non-wildlife and fisheries science majors only.
Ornamental Horticulture and Landscape Design

MAJOR:  DEGREE

Plant and Soil Science

MAJOR

DEGREES

Plant and Soil Science

Profs:

L. F. Sear (Head), Ph.D. North Carolina State;
B. V. Conner, Ph.D. Washington State; A. H. Fribourg, Ph.D. Iowa State; G. M. Pessl, Ph.D. Wisconsin; J. W. Day, Ph.D. North Dakota; C. E. Stocker, Ph.D. Wisconsin; A. S. Stoddart, Ph.D. North Carolina State; H. C. May, Ph.D. Florida; H. M. Springer, Ph.D. California Institute of Agriculture

Assistant Professors:

F. L. Allen, Ph.D. Minnesota.

Course Descriptions

4400 Game Birds (4) Biology, classification, identification, distribution, and management of game birds in North America. Prereq: 3230 or 1 yr of zoology. 2 hrs and 1 lab.

4510 Freshwater Fishery Biology (4) Principles and methods of fish population estimation; fish community evaluation; fish population dynamics; sampling techniques and equipment; warm and cold-water environments as commercial and sport fisheries. Prereq: 1 yr biology and 8 hrs mathematics or consent of instructor. 3 hrs and 1 lab or field period.

4520 Management of Lakes and Ponds (4) Principles and methods of lake and pond management, including feasibility for commercial and sport fisheries; design, renovation, and stocking procedures; biology and culture of managed species. Prereq: 4510 or consent of instructor. 3 hrs and 1 lab or field period.

5000 Thesis

5110 Special Problems in Wildlife and Fisheries Science (1-6) May be repeated. Maximum 9 hrs.

5210 Seminar in Wildlife Conservation (3) Current studies, problems and issues in wildlife conservation; wildlife agencies and organizations and their programs. Prereq: 3230 or consent of instructor.

5310 Seminar (1) Current developments in wildlife and fisheries science. May be repeated. Maximum 3 hrs. S/NC only.

5400 Advanced Topics in Wildlife Science (3) Recent advances and concepts, research techniques, and analysis of current problems. Prereq: 4450 and 4460 or consent of instructor. May be repeated. Maximum 6 hrs.

5450 Wildlife Diseases (3) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in the field and laboratory. Investigative procedures concerning wildlife disease problems. Prereq: 1 yr zoology. 1 qtr microbiology, pathology or parasitology, or 4450 or 4460, or consent of instructor. 2 hrs and 1 lab.


5500 Advanced Topics in Fishery Science (3) Recent advances and concepts, research techniques, and analysis of current problems. Prereq: 4520 or consent of instructor. May be repeated. Maximum 6 hrs.
processing markets; emphasis on sweet potatoes, beans, tomatoes, pepper, cucumbers, corn, and okra. Need not have 3510 as prereq. Prereq: 8 hrs of biological science. 2 hrs and 1 lab.

3610 Interpretation of Agricultural Research (3) Statistics as applied to agriculture. Statistical methods in interpretation of research results. Prereq: Mathematics 1550.

3710 Principles of Weed Science (4) Basic principles of weed science, history, ecology, economic losses, means of control, types of herbicides, and specific recommendations for various crops and non-crop uses. Prereq: 8 hrs biological science and 3 hrs organic chemistry. 3 hrs and 1 lab.

4110 Soil Chemistry (4) Colloidal systems; properties and behavior of colloidal soil materials; relationships of chemical properties to plant nutrient availability. Prereq: 2130 and Physics 1210. 3 hrs and 1 lab.

4120 Principles of Crop Breeding (4) Genetic principles and techniques used in crop improvement. Prereq: 8 hrs biological science or consent of instructor. 3 hrs and 1 lab.

4250 Agricultural Chemicals and the Environment (4) Characteristics, use, mode of action, degradation, and environmental impact of chemicals used in agriculture, forestry, and related areas with an emphasis on agricultural pesticides; environmental safeguards imposed by federal and state regulations on chemical development and use. Prereq: 1 yr biological science and 1 yr chemistry. 3 hrs and 1 lab.

4320 Soil Formation, Morphology, and Classification (4) Soil formation; properties, distribution, and classification of soils; interpretation of morphology; use of soil surveys. Prereq: 2130. 3 hrs and 1 lab.

4400 Problems in Plant and Soil Science (1-6) May be repeated. Maximum 9 hrs.

5000 Thesis

5100 Special Problems in Plant and Soil Science (1-6) May be repeated. Maximum 9 hrs.

5200 Soil Crop Relationships (3-6) May be repeated. Maximum 6 hrs.

5240 Soil Productivity and Management (3) Concepts of soil productivity and management, quantitative evaluation of factors and their interaction affecting soil management decisions, cropping systems, water control and management, tillage and fertility management. Planning and evaluation of specific soil management programs. Prereq: 3220 and 4110 or consent of instructor.

5250 Pedology (4) Factors and processes of formation as related to physical, chemical, and mineralogical properties of soils; soil in an ecosystem; classification of soils. Prereq: 4200 or consent of instructor. 3 hrs and 1 lab.

5310 Design and Interpretation of Experiments (3) Experimental design and procedures; effect of different variables on precision of experiments; problems dealing with the analysis of data. Prereq: 3610 or equivalent.

5340 Soil Physics (3) Chemical and physical relationships among solid, liquid, and gaseous phases of soil mass; relation to plant growth and soil management. Prereq: 4110. 2 hrs and 1 lab.

5370 Advanced Soil Fertility (3) Fundamental concepts and soil chemistry as they relate to nutrient absorption by plant roots; interrelation of these concepts in soil fertility and soil management. Prereq: 4110.

5390 Soil Physical Chemistry (3) Structural properties of soil minerals determining physicochemical reactions, ion exchange, Donnan equilibrium, double layer theory. Prereq: 4110; Chemistry 4110 or concurrent registration.

5600 Seminar (1) May be repeated. Maximum 3 hrs.
School of Architecture

Donald D. Hanson, Dean
William J. Lauer, Associate Dean

Professors:

Associate Professors:

Assistant Professors:

Lecturers:

4031 Accelerated Historical Studies I (4) Introduction to the evolution of architectural periods with selected illustrations from local examples. Advanced examination of the relationship of historical and cultural developments to the built environment from antiquity through the Byzantine period with applications to present-day design issues. Independent student projects on topics related to course material. Prereq: Admission to accelerated core program.

4032 Accelerated Historical Studies II (4) Advanced examination of the relationship of historical and cultural developments to the built environment from the Romanesque period through neoclassicism with applications to present-day design issues. Study of historical research methods and analysis. Independent student projects on topics related to course material. Prereq: 4031.

4033 Accelerated Historical Studies III (4) Advanced examination of the historical and cultural events of the Industrial Revolution which gave rise to the modern movement in architecture and design with applications to present-day design issues. Changing concepts of ethics, aesthetics, and architectural theory. Independent student projects on topics related to course material. Prereq: 4031 and 4032.

4170 Introduction to Preservation and Restoration (4) History and theory of restoration and preservation.

4175 Technology of Preservation (4) History of technology and materials, methods analysis and dating, techniques of preservation.

4311 Historic Preservation Laboratory (8) Directed studies for buildings of historical significance. Techniques of preservation; research of historic methods of construction; and studies of viable uses. Rehabilitation, restoration, preservation, and adaptive uses.


4733 Structural Design for Protection Against Extreme Hazards (4) Probability, risk, human values, insurance. Survey of possible hazards; floods, fire, hurricanes, and tornadoes. Earthquakes, nuclear effects, internal and external explosions. Building code and engineered design of steel, masonry, concrete, and wood structures to resist extreme effects. Protective construction for human and system needs. Fire protection engineering, fire phenomena, life safety and analysis, high-rise building fires.

4739 Aesthetics of Engineering Structures (4) Architecture in engineering; theory and utilization of space, design, and materials in large structures. Bridges, exhibition halls, power plants.


4859 Environmental Science (4) Advanced lecture of graduate students and upper division students. Advanced lecture course of theoretical issues involved in considering environment as a medium of human communication. Codes and nature of coding behavior in animals and man. Relationship between coding behavior and the organization of the central nervous system. Coding and social behavior. Communication process as a generic model of man-environment relations. Hierarchical aspects of environmental communications. Prereq: 2000 or consent of instructor.

4910 Architectural Photography (4) Photography as a design, research and presentation medium. Emphasis on architectural photography using black and white media.

4920 Advanced Architectural Photography (4) Application of special photographic techniques with emphasis on color printing and processing. Prereq: Consent of instructor.


College of Business Administration

C. Warren Neel, Dean
Francis A. Chamblin, Assistant Dean for Graduate Programs
Liston M. Fox, Assistant Dean
John A. Bachmann, Director, Management Development Programs
David A. Hake, Director, Center for Business and Economic Research

Graduate programs of the College of Business Administration are designed to prepare men and women to assume executive, managerial and professional positions in the increasingly complex world of domestic and international business and industry, teaching and research, government and institutional management.

Viewing the business firm as operating in a dynamic social, political and economic environment which demands leaders capable of dealing with innovation and rapid change, the College places central importance on development of students' thought processes rather than on specialized subject matter and courses descriptive of past practices. Emphasis is focused on flexibility of mind, receptivity to new ideas, capacity to adapt one's reasoning powers and judgment to rapid changes, vigor and imagination in using the mind, ability to reason analytically and logically and, above all else, inculcation of an irrepressible desire to continue to learn and grow in knowledge throughout the student's life.

Graduate Programs

The College of Business Administration offers programs leading to seven advanced degrees: the Doctor of Business Administration, the Doctor of Philosophy with majors in Economics and in Management Science, the Master of Arts and the Master of Arts in College Teaching with a major in Economics, the Master of Science with majors in Economics and Statistics, the Master of Accountancy in Accounting, and the Master of Business Administration. The Department of Management participates with the Department of Psychology in the College of Liberal Arts in offering an intercollegiate program in Industrial and Organizational Psychology leading to the Master of Science and Doctor of Philosophy degrees. (See page 97.)

The department of Management Science offers an intercollegiate program leading to the Master of Science degree. (See page 96.)

The two College-wide programs, the MBA and the DBA, are described below. Descriptions of other degree programs will be found under the appropriate departmental or program headings.

The MBA Program

The College-wide curriculum of the Master of Business Administration program is designed to prepare students for successful careers in business and institutional management and for imaginative and responsible citizenship and leadership roles in business and society. The program is designed to encompass the major functional areas of business and economics in order to provide the perspective necessary for those who aspire to positions of executive and professional leadership. The curriculum reflects the application of evolving knowledge in economics and the behavioral and quantitative sciences. This program is accredited by the American Assembly of Collegiate Schools of Business.

Completion of the MBA program requires from four to six quarters (51 to 78 quarter hours of course work) for a full-time student, depending upon the individual's undergraduate preparation in business and economics. The four-quarter sequence is designed for those who have completed a baccalaureate program in business administration. Those with undergraduate degrees in the humanities, engineering, social sciences or natural sciences will require up to six quarters, depending upon the extent of their preparation in business and economics.

The complete MBA program with a concentration in management is offered by the regular graduate faculty of the College as a part-time evening program on the Knoxville campus, at Oak Ridge, and at the Kingsport University Center.

Students may begin the program in any of the four quarters of the academic year; however, those entering the program in the winter or spring may find it difficult to complete the program in minimum time due to course scheduling and sequencing.

The MBA student may select an area of concentration from the following fields: accounting; economics; finance; forest industries management; governmental financial administration; management; management science; marketing; real estate and urban development; statistics; transportation and logistics.

All entering students must have completed college-level mathematics through at least one quarter (or semester) of calculus or remove the deficiency by taking appropriate courses in mathematics. Specific requirements of the MBA program are shown below. To qualify for the degree, a student must complete a minimum of 51 quarter hours of graduate course work in Groups B, C and D, at least 42 hours of which must be at or above the 5000 level. Further, at least half of the credit hours taken in Group C (concentration area) must be at or above the 5000 level.

There is no thesis requirement although ample opportunity is provided for research and writing in course work.

Group A—Foundation Courses. Required for students who lack adequate preparation in the areas listed. Any or all of these courses may be waived if the student has completed undergraduate course equivalents. Additional prerequisite courses may be required for certain concentration areas. These courses are available only to satisfy Group A requirements and as stated on page 68.

35
consolidations, advanced federal income tax, and computer concepts in accounting. Additionally, at least three of the following must be included: 5110, 5120, 5130, 5210, and 5420.

Economics. (See also Master's and Ph.D. programs in this area.) Area prerequisite: Intermediate Macro- and Microeconomic Theory (6). Any combination of 12-18 quarter hours of economics courses listed in this catalog as approved by the faculty advisor.

Finance. Area prerequisite: Finance 5050 or equivalent (3). A minimum of three courses must be taken in one of the following areas: Financial Management: 5120, 5130, 5140, 5620, 5800, 5990; Investments: 5420, 5430, 5810; Monetary Policy and Financial Institutions: 5800, 5810, 5820, 5830.

Forest Industries Management. Area prerequisite: B.S. degree in forestry or equivalent. Organization, planning and control: 5110, 5120, 5130; Industrial Forestry: Forestry 5260; Topics in Forest Industries Management: 5270. Group D—Elective courses shall be chosen from among those offered in the College of Business Administration and in the Department of Forestry as approved by the student's faculty advisor.

Governmental Financial Administration. Area prerequisite: Economics 5070; Finance 5710, 5720, 5730, 5740; Accounting 5510; Political Science 5740.

Management. Area prerequisite: Management 5050 or equivalent (for 5410 only); Organization, Planning and Control: 5110, 5120, 5130; Personnel Management: 5210, 5220, 5230 (core course), 5240; Production Management: 5410, 5420, 5430; Management of Industrial Research: 5320; Management of Foreign Operations: 5710.

Management Science. (See also Master of Science and Ph.D. degree programs in this area.) Area prerequisite: Mathematics through second year of calculus, a course in application of digital computers in engineering and science, a course in statistics for engineering. Statistics 5110 and Management Science 5310 are substituted in Group D—Core for Management Science 5311 and Management Science 5100, respectively. Group C—Concentration includes Management Science 5330 and 5340 and two to four additional courses selected from computer science, management science, statistics, or mathematics as approved by the faculty advisor.

Marketing. Area prerequisite: Marketing 5050 or equivalent and 5200 (core course). Any combination of 12-18 quarter hours of marketing courses listed in this catalog as approved by the faculty advisor. Marketing 5300, 5350, and 5410 are required.

Real Estate and Urban Development. Area prerequisite: Economics 5050-60, Real Estate 5110, 5120, 5130, 5140, Economics 5610. A course selected from architecture, civil engineering, economics, planning, transportation or other relevant areas approved by the faculty advisor.

Statistics. (See also College of Science program in this area.) Area prerequisite: Mathematics through second year of calculus including differential equations. Any combination of 12-18 quarter hours of statistics courses listed in this catalog as approved by the faculty advisor.

Transportation and Logistics. Area prerequisite: Transportation 5050 or equivalent. Any combination of 12-18 quarter hours of transportation courses listed in this catalog as approved by the faculty advisor. Transportation 5210 normally is required.

Group D—Electives. Unless the student elects two areas of concentration, a minimum of 6 quarter hours must be taken in areas outside the area of concentration. The elective area is increased beyond 6 hours to the extent that the concentration area is less than 18 hours. With specific approval of the student's advisor, an elective course may be taken outside the College of Business Administration.

Total, Group D .................................................. 6-12

Total Program (except Group A) ........................................... 51

Other Requirements. The application for admission to candidacy (see page 20) must be approved by two faculty members in the student's area(s) of concentration and the Assistant Dean for Graduate Programs of the College of Business Administration before submission to the Vice Chancellor for Graduate Studies and Research.

To qualify for the degree, the student must achieve a B average (3.0) or above in courses taken in this catalog as well as in the overall program and pass a written comprehensive examination during the final quarter of the program. If the results of the written examination are not clearly passing or failing, a supplementary written or oral examination may be given in the same quarter. The complete examination process may be repeated one time, but it may not be taken until the quarter following the first attempt.

Dual J.D.-MBA Program

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both Doctor of Jurisprudence and Master of Business Administration degrees. A student pursuing the dual program may save up to two academic quarters (24 hours) of course work which would be required if the two degrees were to be earned separately.

Admissions. Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and the Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee.

Students who have been accepted by both colleges may apply anytime prior to, or after, matriculation in either college and may commence studies in the dual program at the beginning of any quarter subsequent to matriculation in both colleges, provided, however, that dual program studies be started prior to entry into the last 42 hours required for the J.D. degree and the last 24 hours required for the MBA degree.

Curriculum. A dual program candidate must satisfy the graduation requirements of each college. Students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation from either college for

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<th>Quarter Hours</th>
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<tr>
<td>Accounting 5050-60 Financial Accounting</td>
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<td>Accounting</td>
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<tr>
<td>Business Administration:</td>
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<tr>
<td>Economics 5050-60 Economic Analysis, Problems and Policies</td>
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<tr>
<td>Finance 5050 Survey of Finance</td>
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<td>Management 5050 Production Management</td>
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<td>Marketing 5050 Survey of Marketing</td>
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<tr>
<td>Office Administration 5050 Data Processing in Business</td>
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<td>Group B—Core for all Candidates</td>
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<td>Accounting 5810 Accounting for Control</td>
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<td>Economics 5070-80 The Firm and Its Financial Needs</td>
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<td>Finance 5110 Theory of Financial Management</td>
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<td>Management 5220 Human Problems in Administration</td>
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<td>Management 5220 Human Problems in Management</td>
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<td>Management 5230 Management Information Systems</td>
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<td>Management 5311 Probability Theory</td>
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<td>Management 5500 Introduction to Management Science or Statistics 5312</td>
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<td>Statistics Methods</td>
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<td>Business Administration 5310 Business Policy</td>
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<td>Group B .................................................. 27</td>
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<td>Group C—Concentration</td>
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| MBA CONCENTRATIONS: Typical course groupings are listed below. Area prerequisites may be taken in one's undergraduate program or included in the MBA curriculum prior to undertaking courses in the concentration area. Accounting. Graduates are eligible for the CPA examination in Tennessee. Area prerequisite: Introductory Financial Accounting (6); Marketing 5200 Cost Accounting (6); Intermediate Theory (9); and Federal Income Tax (3).

The following areas must be included in the concentration unless taken in undergraduate program: auditing,

1 May not be taken by students whose undergraduate major was accounting or whose MBA area of concentration is accounting. Student's faculty advisor must approve course to be substituted.

2 May not be taken by students whose program includes Economics 5110. Student's faculty advisor must approve course to be substituted.

3 May not be taken by students whose program includes Management Science 5510.
The DBA Program

The basic objective of the Doctor of Business Administration program is to provide the student with an opportunity to attain the intellectual competence necessary to meet the highest standards for advancement to a professional position in an academic institution, business and industry, or government. The student will develop a sound foundation for expanding knowledge in the student's chosen area of concentration and will contribute through research to advancement of the state of knowledge in this field. Moreover, the student's educational experience should develop perspective toward education for business in a manner that will enable the student to respond and change in response to needs.

The DBA program is structured around four major features. First, it recognizes the interdisciplinary thrust of graduate education and provides the student with a sound foundation for expanding the body of knowledge related to business systems and their interactions with other socioeconomic systems and environmental forces. Second, the student's program is flexible enough to respond to individual needs and interests yet is formulated within a sound framework to achieve overall objectives. Third, emphasis is placed upon conceptual foundations and analysis of decision-making processes rather than the description of business administration. Fourth, the student does advanced work in the basic disciplines of economic theory, behavioral science and quantitative science to provide the necessary foundation for research.

Foundation Requirements. Although the program is designed for students who have completed an accredited MBA (or equivalent) degree program, those with outstanding undergraduate records in any area may be admitted directly to the DBA program and may, if they desire, earn the MBA degree in a coordinated program of study. Program prerequisites include at least one year of mathematics to include college algebra, general mathematics and a course in single variable calculus; a course in statistics; knowledge of computer programming (FORTRAN IV); Intermediate economic theory (micro and macro); and introductory courses in financial accounting, business finance, marketing, operations production, and the legal environment of business. Entering students deficient in any of these areas may enroll in courses designed to meet these requirements.

Course Requirements for the DBA Program. Each student must demonstrate by passing appropriate graduate level courses and/or by examination, an understanding of the business functional areas, the basic disciplines underlying the study of business administration, the student's concentration area and a supporting area. Following are the requirements for each area:

A. Business Functional Areas. One graduate level course in each of the following areas must be completed:

Statistics 5311 and 5312 and Management Science 5100 may not be included.

B. Basic Disciplines. Each student must demonstrate proficiency in the following areas by completing course work indicated or by passing appropriate examinations:

Econometrics and Advanced Microeconomic Theory (Economics 5111); Advanced Macroeconomic Theory (Economics 5121).

Behavioral Science1 Organizational Behavior (Management 5230); Behavioral Science2 Organizational Behavior (Management 5230).

Quantitative Science1 12 quarter hours in one or a combination of two of the following areas: statistics, management

1 Students who choose this field as a supporting area take Management 5110 and 5110.
2 Statistics 5311 and 5312 and Management Science 5100 may not be included.

Science, econometrics, or computer science. Approval of student's committee is required.

C. Concentration Area. This is the focal point of the program and is the area in which the student expects to do his/her research and dissertation. A minimum of 24 quarter hours of course work is required, including 9 hours of doctoral seminars taken at this University. A study of research methodology of the discipline is included. Graduate work in the field taken at other institutions is considered by the student's committee in determining additional course work required. Available concentration areas are:

Accounting
Finance
Management
Marketing
Transportation and logistics

D. Supporting Area. A minimum of 12 quarter hours of graduate course work is required in an area complementary to, the concentration area. The student may choose the supporting area from one of the following: one of the business functional areas, additional work in one of the basic disciplines or a related area in another school or college of the University. The program of study should be arranged with an advisor in the discipline chosen and must be approved by the student's committee.

Preliminary Examinations. Comprehensive written preliminary examinations consisting of two sessions of four hours each in the concentration area and one four-hour session in the supporting area are required of each person working toward the DBA degree. The student's committee may, if they deem it advisable, supplement the written examinations with oral examinations, and may accept the results of an oral examination only for supporting areas outside the College of Business Administration. These examinations are scheduled twice a year, in early October and early May. The student may opt to sit for all sessions during a single examining period, or may sit for the concentration sessions and the supporting session in two successive periods. A student who fails an area on the first attempt must, if he/she wishes to continue in the program, retake the examination at the next scheduled administration, the results of which shall be final.

Admission to Candidacy. A student may apply for admission to candidacy for the DBA degree after maintenance of at least a B average in course work, successful completion of preliminary examinations and acceptance of a research proposal for the dissertation by his/her faculty committee. Admission to candidacy must be approved at least three quarters prior to the date the degree is conferred. (Admission in the fall quarter permits graduation in the following spring quarter.) Prior to presenting the research proposal for formal approval, the student must form his/her faculty committee and arrange for the concentration area department head to recommend their appointment by the Vice Chancellor for Graduate Studies and Research. There must be at least four members, one of whom must be from a
department (or discipline) outside the concentration area.

Research and Dissertation (minimum of 36 quarter hours). The purpose of this segment is to provide the candidate with a research experience that meets the general standards of the profession. The dissertation is supervised by the candidate’s faculty committee, who must certify its completion and acceptability after the candidate’s oral defense of his/her research effort.

Other Requirements. For information concerning program admission requirements, academic performance standards, fellowships and assistantships, and general rules and regulations of the Graduate School, see other parts of the College of Business Administration section and the first section of this catalog, “The Graduate School.”

Minimum Academic Performance Standards

A graduate student in the College of Business Administration whose grade point average at any point after 12 hours is below 3.0 shall be placed on probation. A student on probation shall be dropped from the program if his/her cumulative grade point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 quarter hours of course work attempted which is specified in the student’s degree program. Exceptions to this policy may be made only with the approval of the Assistant Dean for Graduate Programs of The College of Business Administration upon recommendation of the student’s faculty committee.

Admission Requirements

General admission requirements for the Graduate School are stated on pages 11-12. MBA and DBA applicants are required to take the Graduate Management Admission Test (GMAT). Applicants for programs in economics, management science, and statistics may submit results of either the GMAT or the Graduate Record Examination (GRE) aptitude portion. Applicants for economics who submit GRE aptitude scores must also submit the Advanced GRE score for economics. Applicants for management science must meet the quantitative methods prerequisites stated in the program description. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL). Scheduled dates and locations for taking these examinations may be obtained from Educational Testing Service, P.O. Box 966, Princeton, New Jersey 08540, and from most colleges and universities.

In addition to procedures required for admission to the Graduate School (pages 11-12), DBA applicants must submit additional forms provided by the College of Business Administration. The application for all programs and supporting materials should be submitted at least three months prior to desired entry date.

The College of Business Administration is associated with other leading universities of business as a member of the Graduate Management Admission Council.

Fellowships and Assistantships

Fellowships. Information concerning non-service fellowships administered by the Graduate School as well as application blanks may be obtained from the office of the Vice Chancellor for Graduate Studies and Research.

Assistantships. A limited number of graduate assistantships are available in each of the academic departments and in the Center for Business and Economic Research. Assistantships which carry remission of tuition and/or fees range up to $4500 per year, while others funded through various research centers of the University range up to $5500 per year for half-time service. Awards are generally made on the basis of scholarship and performance on the admission test. Applications forms may be obtained in any of the departments or from the office of the Assistant Dean for Graduate Programs. Applications must be received by March 15 for consideration of assistantships to be awarded for the following fall term.

Center for Business and Economic Research

The staff of the Center for Business and Economic Research engages in studies of the business and economic environment in Tennessee, the Southeast, and the nation. The Center serves the business community, state government, individuals, and the University through dissemination of various kinds of economic and socio-economic information. The Center supports the faculty of the College in seeking funding for research projects. Staff members conduct research in regional economics, public finance, and areas related to socio-economic problems in the region. The Center publishes the results of its own research and that of others in monograph form so that significant developments in the various business disciplines and economics can achieve widespread exposure. In addition, the Center staff does contract research on business and economic problems for state government and private industry. The Center publishes periodically the Tennessee Statistical Abstract and bimonthly the Survey of Business. The Center is a member of the Association for University Business and Economic Research.

Management Development Programs

The Management Development Programs Department offers a wide variety of programs ranging from two- to three-day public seminars and customized “in-plant” programs to the four-week Tennessee Executive Development Program.

The Tennessee Executive Development Program (TEDP) is designed to provide extensive continuing educational opportunities for executives from firms and organizations in Tennessee, the South, and the nation. The major objective of the program is to prepare and develop executives for progressively higher levels of management responsibility and to sharpen existing executive skills needed for comprehensive decision making and leadership. Other major aims of the TEDP are to teach the fundamentals of analytical thinking and the use of the decision tools, and to examine the economic, political, technological and other environmental factors affecting the firm’s operations.

The TEDP limits enrollment to thirty-six participants who live on campus for a total of four weeks spread over a three-month period. This arrangement provides executives with extensive opportunities to exchange ideas and operational concepts with contemporaries in other business areas and with TEDP faculty as well.

The faculty for the TEDP consists of senior professors who teach business-related subjects in the University's graduate programs and nationally recognized professors of other institutions. Each participating faculty member has extensive experience in either consultation with or actual operations in business and industry. The TEDP faculty is augmented by outstanding practitioners in their fields of business and industry.

Departments of Instruction

Numbers in parentheses following the course titles indicate quarter hours credit offered.

Accounting and Business Law

J. E. Kiger (Head), Ph.D. Missouri, C.P.A.

Accounting

MAJOR

DEGREE

Accounting

M. Acc.

Professors:

R. E. Dilitch, Ph.D. Ohio State, C.P.A.;
J. R. Williams, Ph.D. Arkansas, C.P.A.

Associate Professors:

R. H. Herring, Ill, Ph.D. Alabama, C.P.A.;
R. A. Jacobs, Ph.D. Georgia, C.P.A., C.M.A.;

G. E. Nichols, Ph.D. Louisiana State, C.P.A.;
I. A. Posey, M.S. Tennessee, C.P.A., C.M.A.;
W. L. Slagle, M.S. Tennessee, C.P.A.;
K. G. Stanga, Ph.D. Louisiana State, C.P.A.;
R. L. Townsend, Ph.D. Texas, C.P.A.;
F. W. Watkins, Ph.D. Louisiana State, C.P.A.

Assistant Professors:

D. J. Callins, Jr., Ph.D. Massachusetts; M. C. Letinger, M.S. Tennessee, C.P.A.;
J. V. Scheiner, Ph.D. Ohio State, C.P.A.

THE MASTER OF ACCOUNTANCY PROGRAM

The objective of the Master of Accountancy (M.Acc.) program is to provide persons having an undergraduate
accounting background and a high level of ability and motivation with the depth and understanding of accounting which will enhance their probability of success in a career in professional accounting. Moreover, the student's educational experience should develop perspective toward the discipline of accounting in a manner that will enable the student to appraise selected evaluative change in response to needs in public accounting, business, industry or government.

Foundation Requirements. Although the program is designed for students who have completed an accredited baccalaureate degree program with a major in Accounting, those with outstanding undergraduate records in any area may earn the M.Acc. degree by first completing prerequisites in accounting and other business and related disciplines individually designed to supplement the applicant's undergraduate background. Program prerequisites, therefore, include the equivalent of an undergraduate degree in accounting including courses in taxation of estates and gifts and in advanced auditing. Each course is 3 quarter hours of graduate credit.

Business Core—21 quarter hours
Economics 5070 The Firm and Its Environment (macroeconomics)
Finance 5110 Theory of Financial Management
Management 5230 Human Problems in Administration
Marketing 5200 Marketing Management
Management Science 5100 Introduction to Management Science
Statistics 5311 Fundamental Concepts of Probability Theory
Statistics 5312 Statistical Methods
Accounting 5110 Seminar in Accounting Theory
Accounting 5120 Seminar in Advanced Auditing
Accounting 5130-40 Seminar in Current Accounting Topics (6 hours)
Accounting 5150 Research in Accounting
Accounting 5210 Seminar in Advanced Managerial Cost Accounting
Accounting 5640 Seminar in Accounting Information Systems
Accounting Electives (Select two)—6 quarter hours
Accounting 5160 Graduate Internship in Accounting
Accounting 5220 Seminar in Advanced Managerial Cost Accounting
Accounting 5430 Tax Planning
Accounting 5510 Not-for-Profit Accounting
Accounting 5640 Seminar in Accounting Information Systems
Total M.Acc. Program—51 quarter hours
Each student must pass a final written comprehensive examination during the final quarter of study for the degree.

4120 Advanced Auditing (3) Case-oriented course including audit of specific asset, liability, revenue and expense accounts, with emphasis on reporting, data processing, statistical sampling, and internal auditing. Prereq: 4110 with C or better.

4630 Analysis and Design of Information Systems (3) General systems concepts, flowcharting, planning of systems study, determination of systems objectives, development and evaluation of design alternatives, implementation, documentation and control. Prereq: Computer Science 3910.

4950 Individual Research in Accounting (3) Special projects undertaken by majors in accounting under the direction of faculty members of professional rank in C or D.

4990 Accounting Theory (3) Theory and conceptual framework underlying measurement of income and financial position as related to the principles of the reporting problems. Prereq: 3130 with C or better.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise satisfied by meetings with his advisor of the equivalent of an undergraduate degree in accounting. May not be used toward degree requirements. May be repeated. S/NC only.


5110 Seminar in Accounting Theory (3) Evolution of accounting theory, concepts underlying financial reporting models, and authoritative accounting literature as each relates to periodic performance and financial position. Prereq: Consent of instructor. May not be taken by accounting majors. Prereq: 5140.

5120 Seminar in Advanced Auditing (3) Theory and concepts underlying the philosophy of auditing as related to current auditing issues. Prereq: 4120 or equivalent.

5130 Seminar in Accounting Topics (3, 3) Critical in-depth consideration of current issues in financial accounting literature. Prereq: 4980 or 5110. Must be taken in sequence.

5150 Research in Accounting (3) Directed problem-oriented research during any quarter when a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5210 Seminar in Advanced Managerial Cost Accounting (3, 3) Directed problem-oriented research during any quarter when a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5310 Seminar in Accounting Theory (3) Evolution of accounting theory, concepts underlying financial reporting models, and authoritative accounting literature as each relates to periodic performance and financial position. Prereq: Consent of instructor. May not be taken by accounting majors. Prereq: 5140.

5420 Tax Research (3) Development of expertise in tax research utilizing tax service, tax periodicals, legal cases and other available sources. Included are individual research projects. Prereq: 4430 or equivalent.


5510 Not-for-Profit Accounting (3) Theory and practice of budgeting and fund accounting, financial reporting, measures of output and accomplishment, and financial and performance auditing for non-profit entities. Prereq: 9 hrs of accounting and consent of instructor.

5630 Accounting Systems and EDP Concepts and Control (3) Elements and operation of computer in business environment. Analysis, design, implementation, documentation, and control of accounting systems. Prereq: 2130 and knowledge of a computer programming language.

5640 Seminar in Accounting Information Systems (3) Literature on accounting information systems and advanced systems analysis and design. Concepts and implications of other functional areas of business and interacting of these areas. Prereq: 4630 or equivalent.

5810 Accounting for Control (3) User-oriented survey of control principles and cost accounting topics. Prereq: 5060 or equivalent or consent of instructor. Not available for accounting majors.

5820 Corporate Reporting Problems (3) User-oriented analysis of current corporate financial reporting problems and issues. May not be taken for credit by students who choose undergraduate major was accounting, or whose graduate concentration is accounting. Prereq: 5810 or consent of instructor.

6100-20-30 Doctoral Seminar in Accounting (1, 1, 1) Research and discussion of topical contemporary issues in practice of accounting. May be repeated. Admission by consent of department head. S/NC only.

6000 Doctoral Research and Dissertation
6110-20-30 Doctoral Seminar in Accounting (3, 3, 3) Analysis of issues reflected in accounting literature. Prereq: 9 hrs of graduate credit in accounting and consent of instructor.

Business Law

5050 Legal Environment of Business (3) Surveys legal and quasi-legal institutions with emphasis on the administrative agencies which have particular significance to the businessman, and examines government regulation of business; explains basic legal notions and principles that pertain to businessmen. (Available only as stated on page 36.)

Business Administration
MAJOR DEGREES
Business Administration MBA, DBA

5310 Business Policy (3) Case studies covering policy formulation and administration; point of departure—top and middle management, where company-wide objectives are set and departmental policies and activities are coordinated; organizing and administering personnel to reach company objectives, continuous administrative reappraisals. Enrollment limited to given MBA candidates in last quarter of their program. Prereq: All other Group B (core) courses of MBA program.

5410 Business and its Societal Environment (3) Analysis of current social changes in society and interrelation of plans and actions in business firms with environmental factors. Prereq: Consent of instructor.
Committee.

or above with an average grade of B or better or by satisfying an examining committee.

demonstrate their competence in the core classes.

THE DOCTORAL PROGRAM

alternative sequence of 9 hours to meet the requirements for a graduate major in Economics for the Master of Arts and the Master of Science degrees.

Economics

MAJOR

DEGREES

Economics

M.A., MACT, M.S., Ph.D.

Professors:


Associate Professors:

S. L. A. Shreve (visiting), Ph.D. California (Los Angeles); T. L. Majors (visiting), B.A. Tennessee; N. C. C. Hodges, Ph.D. Florida; M. J. Morelock, M.A. Washington State; F. M. Murtaugh (visiting), M.A., Tennessee; P. J. K. Parr, Ph.D., State University of New York (Binghamton); A. M. Schottmann, Ph.D. Washington (St. Louis).

THE MASTER'S PROGRAM

The minimum requirements for a graduate major in Economics for the Master of Arts and the Master of Science degrees consist of the following:

(1) Economics 5111-12 and Economics 5121-22, (2) 9 additional hours in economics at the 4000 level or above, (3) a thesis, or an additional 9 hours in economics at the 5000 level or above to be concentrated in one field. Students electing the non-thesis option will be required to pass a written comprehensive examination.

The requirements for a graduate minor in Economics are as follows:

Either (1) 5111-12 and 5112-22, or (2) 5111 or 5112, 5140, and one other 4000- or 5000-series economics course or (4) with the consent of the head of the department, an alternative sequence of 9 hours to meet unusual conditions.

MASTER OF ARTS IN COLLEGE TEACHING DEGREE

The requirements for the MACT degree are listed on page 20. A thesis is required.

THE DOCTORAL PROGRAM

Subject Area Requirements

1. Students will be required to demonstrate their competence in the core subject fields as indicated:

a. Economic theory, by a preliminary examination.

b. Economic history, by completing 6 hours in economics at the 5000 level or above with an average grade of B or better or by satisfying an examining committee.

c. History of economic thought, by completing Economics 5150 and 3 additional hours in this area at the 6000 level with an average grade of B or better or by satisfying an examining committee.

d. Mathematical and quantitative methods in economics by completing Economics 5180, 5190, and 5510 with an average grade of B or better or by satisfying an examining committee.

(Note: The Economics 5150 requirement may be waived for those students completing Economics 6170, 6180, and 6190.)

2. Students will be required to demonstrate their competence by preliminary examination in three fields with the approval of the department, at least two of which must be selected from the following; economic development; course offered at convenience of department, combining two or three of the above.

Exceptions to the foregoing are discouraged but may be petitioned by writing directly to the department head who will decide with the advice of an ad hoc committee of three tenured members of the faculty. This petition is to be submitted at least nine months before the student takes the preliminary exam in question.

Course Requirements.

Candidates for the Ph.D. degree in Economics will be required to complete a minimum of 72 quarter hours of course work beyond the Bachelor's degree, plus the dissertation which carries 36 quarter hours of credit. At least 54 hours shall be in economics.

4000 Special Topics (3) Student-generated course offered at convenience of department upon student initiative. Subject matter and content determined by students and instructor with approval of the department.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Requires written thesis. Not other- wise registered during any quarter when such a student uses university facilities and/or faculty time before degree may not be used toward degree requirements. May be repeated. S/NC only.

5011-12 Problems in Lieu of Thesis (3, 3) 5110-20 Economics Seminar (1, 1, 1) Research in progress and discussion of selected topics. May be repeated. S/NC only.

6000 Doctoral Research and Dissertation ECONOMIC THEORY

4110 Managerial Economics (3) Application of economic theory to business decision-making, emphasis on profit objectives, measurement and forecasting demand and costs, and capital budgeting. Prereq: 2110-20-30. (Same as Water Resources Development 4110.)

4130 Business Cycles (3) Fluctuations in income, employment, prices, and output in the economic system; subjects discussed are the historical facts concerning booms and depressions, statistical methods for analyzing business fluctuations, theoretical explanations of cyclical deviations, and policies that have been proposed to combat them. Prereq: 3120 or consent of instructor.

4150 History of Economic Thought (3) Development of early and modern schools of thought, and economics as a social science, together with an analysis of socioeconomic conditions which influenced this development. Period covered: 1776 through 1938. Prereq: 1 yr of principles of economics and consent of instructor.

4170-80 Introduction to Mathematical Economics (3, 3) Application of mathematical methods in theoretical study of micro- and macroeconomic phenomena. Designed for beginning graduate students who have limited training in analytic geometry and calculus. (Available only as stated on page 502.)

5011 Microeconomics (3) Basic topics in microeconomics, verbal arguments and geometric algebraic techniques. Theory of consumer behavior and demand, theory of production and costs, and short and long run profit maximization in both perfectly competitive and monopolistic environments, theory of demand, supply, and market equilibrium. Prereq: 5110.

5112 Microeconomic Theory (3) Fundamental theory of price determination in partial and general equilibrium settings, including theories of preferences and production, and short and long run profit maximization under conditions of perfect and imperfect competition, demand for factors of production and distribution. Prereq: 4170 and 5111 or equivalent.

5121-22 Macroeconomic Theory (3, 3) Determination of levels of employment and prices for economy as a whole, focusing on relationships between interest rates, price expectations, productivity, and quantity of money, on one hand, and aggregate saving, investment, and liquidity preferences on the other. Prereq: Intermediate macroeconomic theory or equivalent.

5150 History of Economic Thought (3) Development of economic ideas from mercantilism through classical and neoclassical tradition.

5180-90 Mathematical Methods in Economics (3, 3) Application of basic concepts in differential and integral calculus, difference and differential equations, linear algebra and stochastic matrices to topics in theory of firm, growth models, game theory, linear programming, and decision making under uncertainty. Prereq: 1yr of calculus.

5510 Quantitative Methods in Economics Research (3) Methods of estimation and testing of economic relationships with use of time series and cross section data, with applications to current economic problems. Prereq: Introductory statistics or Statistics 5211 or the equivalent.

5620 Introduction to Econometrics (3) Statistical analysis, forecasting, and cost analysis, distribution of income and wealth, models of growth and cycles, macroeconomic applications. Prereq: 1yr of calculus. Students should be taking Economics 6170-80-90.

5710 Public Finance: Revenues (3) (Same as Finance 5710.)

5720 Public Finance: Expenditures (3) (Same as Finance 5720.)

5740 Seminar in Public Finance (3) (Same as Finance 5740.)
5810 Financial Markets and Intermediaries (3) (Same as Finance 5810.)
5820 Monetary Theory and Policy (3) (Same as Finance 5820.)
5830 Commercial Bank Management (3) (Same as Finance 5830.)
6111 Seminar in Advanced Microeconomic Theory (3) Topics in microeconomic theory. May be repeated with consent of department. Prereq: 5111, 5112 and consent of instructor.
6121 Seminar in Advanced Macroeconomic Theory (3) Topics in macroeconomic theory. May be repeated with consent of department. Prereq: 5121, 5122 and consent of instructor.
6150-60 History of Economic Doctrines (3, 3) Important ideas of economic thinkers from Middle Ages to present.
6170-80-90 Econometric Methods (3, 3, 3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression model, extensions of least squares regression model, and approaches to simultaneous equation models with application to current economic research. Prereq: 5180-90, 5260, and consent of instructor.
6710-20 Seminar: Fiscal Theory and Public Finance (3, 3) (Same as Finance 6710-20.)
INTERNATIONAL TRADE AND ECONOMIC DEVELOPMENT
4230 Problems in International Trade and Economic Development (3) Problems or problem areas of current importance in fields both of international economics and economic development. Prereq: 3210 or 3220.
4231 The Political Economy of Latin America (3) Description, analysis, and comparison of major economics problems and policies of Latin American countries.
4232 The Political Economy of Asian Development (3) Description, analysis, and comparison of major economics problems and policies of India, China, and Southeast Asian countries.
4260 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Prereq: 3210.
5210 Seminar in International Trade Theory (3) Pure theory of international trade.
5220 Seminar in Economic Development (3) Economic problems of developing countries.
5250 Economic History of Europe (3) Nature and functioning of economic systems and policies in history of western civilization; examination of some major issues of method and interpretation.
5260 Economic History of the U.S. (3) Interpretation of American economic structure and policies from colonial times.
5510 Location and Regional Development Theory (3) Theory of industrial, agricultural, and residential location; economic bases for land use patterns and central places; examination of regional processes and national assistance for regional economic development.
5620 Methods of Regional Analysis (3) Theory of regional structure and growth. Examination of regional models for impact analysis and economic forecasting. Methods of analysis include regional descriptive statistics, gravity and potential concepts, regional income and product accounts, shift and share analysis, economic base studies, and regional input-output, linear programming, and econometric models.
6231-32, 6341-42 Seminar in Economic Development (3, 3, 3, 3) Development and application of analytical tools to problems of economic policy faced by developing regions and countries.
6250 Seminar in European Economic History (3) Selected topics in European economic history. Prereq: Consent of instructor. May be repeated with consent of department.
6260 Seminar in American Economic History (3) Selected topics in American economic history. Prereq: Consent of instructor. May be repeated with consent of department.
6270 Seminar in the Economic History of the Third World (3) Selected topics in economic history of societies other than those of Western Europe and English-speaking North America. Prereq: Consent of instructor. May be repeated with consent of department.
6510 Seminar in Regional Analysis (3) Selected topics in regional economic theory and analysis. May be repeated. Maximum 6 hrs.
6820 Regional Economics Workshop (3) Selected topics in applied regional research. Emphasis on student participation in model design and estimation, forecasting, simulation, and mathematical programming. Prereq: 5180-90. May be repeated. Maximum 6 hrs.
6850 Seminar in Environmental and Resource Economics (3) Topics in environmental quality, natural resource allocation by private markets, and issues in formulating public policy toward environmental problems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
INDUSTRIAL ORGANIZATION
5340 Seminar in Private Enterprise and Public Policy (3) Structure of contemporary industry, factors in development, and consequences for business conduct and performance; social control of business through antitrust and other government regulation. Prereq: 5351-52, 6361-62 Seminar in Industrial Organization (3, 3, 3) 6351-52—Organization of industry in American economy. Emphasis on empirical and analytical techniques used in investigating structure, conduct, and performance. 6361-62—Public policies with respect to industrial structure and business conduct; examination, appraisal, and proposals for change.
ECONOMICS OF CENTRAL PLANNING
5210 Economic Systems (3) Study and appraisal of underlying theories and operation of capitalism, socialism, communism, and other economic systems.
6331 Theory and Practice of Economic Planning (3) Leading issues in imperative and indicative planning. Prereq: Consent of instructor. May be repeated with consent of department.
ECONOMICS OF LABOR AND MANPOWER
4420 Manpower Problems and Policy (3) Current manpower problems and examination of possible solutions. Problems include unemployment-inflation, manpower training and education, poverty and income redistribution, and/or others. Emphasis on analytical basis for understanding manpower problems. Prereq: 2110-20.
5410 Seminar in Labor Manpower Economics (3) Intensive examination of major topics in labor-management economics literature. Emphasis on problems, analysis and possible solutions. Prereq: Consent of instructor.
5420 Seminar in Wage and Employment Theory (3) Current past policies of wage and employment determination. Prereq: 5410, equivalent or consent of instructor.
6411-12, 6421-22 Seminar in Labor Economics (3, 3, 3) Selected labor problems chosen for their current uses universality, significance—development and application of problems and techniques.
FINANCE
Assistant Professors: A. L. Auxier, Ph.D. Iowa; H. S. Benton, Ph.D. Georgia; M. Lindseth, Ph.D. Illinois (Champaign-Urbana); J. M. Wachowicz, Jr., Ph.D. Illinois (Champaign-Urbana); R. A. Weir, Ph.D. Illinois.
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
6000 Doctoral Research and Dissertation
FINANCE AND INVESTMENTS
5050 Survey of Finance Functions in Business (3) Scope and nature of managerial finance: financial analysis, planning and control; financial investment, decision structure and cost of capital; internal and external long-term financing; working capital management. Prereq: A. 5010, A. 5030, and Economics 5060. (Available only as stated on page)
5110 Theory of Financial Management (3) Financial decision making in firm with objective of maximizing shareholder wealth; investment decision, capital costs and financing decision, and dividend decision of firm. Prereq: 5050. Coreq: Statistics 3511.
5120 Quantitative Techniques in Financial Management (3) Applications of mathematics, probability, and statistics to model building and testing in finance. Prereq: 5110 and Statistics 5311 or equivalent.
5130 Financial Administration (3) Cases and readings within firm; refined techniques of analysis; optimal financing decisions; capital cost measurement; utilization of capital markets; general corporate financial theory. Prereq: 5110.
5140 Seminar: Managerial Finance (3) Applications of theory and quantitative techniques to solution of current problems in managerial finance. Prereq: 5120 or 5130.
5420-30 Investments (3, 3) Investment decision making, portfolio construction, and security prices; financial statement analysis; process, factors influencing portfolio policies.
and stock-price valuation models. Must be taken in senior year.

5440 Commodity Futures and Stock Options (3) Trading in commodity futures markets and in "put and call" stock options; factors influencing commodity futures and stock options prices; option valuation models. Prereq: 5420.

5800 Executive-in-Residence Seminar for MBA (3) Practical aspects of financial management and investments. Leading industry, banking, and government financial personnel conduct class. Prereq: Consent of department.

5900 Research in Finance (3) Directed research on topic of mutual interest to the student and staff member. Prereq: 5110. May be repeated. Maximum 6 hrs.


6420 Theory of Finance (3) Theory of financial decision making under conditions of certainty and uncertainty. Application of theory of choice to allocation of financial resources over time with reference to financing decisions, investment decisions, and the determinants of the cost of capital.

6510 Seminar in Financial Management (3) Employment of quantitative techniques in formulation and solution of financial management problems.

MONETARY POLICY AND FINANCIAL INSTITUTIONS

5810 Financial Markets and Intermediaries (3) Capital formation and allocation of capital in U.S. economy and abroad. Process of saving, partial institutionalization of these savings, investments of financial intermediaries, efficiency of allocation process and effect on economy, and impact of financial institutions on financial markets. (Same as Economics 5810.)

5820 Monetary Policy and Theory (3) Relationship of money, credit and liquidity to income, interest rates, employment and prices as well as examination of effect of monetary policy on economic activity. Prereq: Economics 5080 or equivalent. (Same as Economics 5820.)

5830 Commercial Bank Management (3) Bank management decision-making analysis of changes in banking environment and structure; acquisition and management of funds; current banking problems. Prereq: Consent of instructor. (Same as Economics 5830.)

6110-20 Seminar: Monetary Theory (3, 3) Study of money, credit, and liquidity as related to income, interest rates, employment, output, and price levels.

6810 Financial Institutions and Markets (3) Theory of financial markets, role of financial institutions, and analysis of market efficiency.

GOVERNMENTAL FINANCIAL ADMINISTRATION

5710 Public Finance: Revenues (3) Allocative, distributional, and stabilization effects of alternative revenue systems. Coreq: Economics 5080. (Same as Economics 5710.)

5720 Public Finance: Expenditures (3) Functions and growth of public sector, public goods, and benefit/cost analysis. Coreq: Economics 5080 or equivalent. (Same as Economics 5720.)

5730 Finance Administration of Government (3) Budgeting and computerized management in public sector. Prereq: Economics 5080 or consent of instructor.

5740 Seminar in Public Finance (3) Selected topics: public choice, pricing government services, and financial and economic dynamics. Prereq: 5710. (Same as Economics 5740.)

6710-20 Seminar: Fiscal Theory and Public Finance (3, 3) Advanced topics in fiscal theory and policy. (Same as Economics 6710-20.)

INSURANCE

5110 Theory of Risk Management (3) For students with no background in risk and insurance. Risk management and manageable risks facing individual and firm. Analysis of risk management techniques with emphasis on insurance as a tool.

REAL ESTATE AND URBAN DEVELOPMENT

4900 Aspects of Urban Environment (4) Interdisciplinary course in urban problems. Prereq: Consent of instructor. (Same as Architecture 4900 and Psychology 4900.) S/NC only.


5120 Real Estate Analysis (3) Analysis of real property investment, real estate appraisal and appraisal theory. Prereq: Finance 5050 or equivalent.

5130 Housing and Urban Land Markets (3) Analysis of housing demand, supply and location. Segregation and housing discrimination. Impact of urban renewal and public policy on housing markets. Prereq: 5110 or consent of instructor.

5140 Real Estate Investment and Taxation Analysis (3) Analysis of economic factors and institutions which underlie real estate investment decision-making and method utilized. Prereq: 5120 or consent of instructor.

Management

Professors:

Associate Professors:
F. A. Chamblin, MBA Indiana; O. S. Fowler, Ph.D. Georgia; R. C. Maddox, Ph.D. Texas; C. W. Neel, Ph.D. Alabama.

Assistant Professors:
J. A. Bachmann, Ph.D. Virginia Polytechnic Institute; W. Henderson, Ph.D. Purdue; M. C. Rush, Ph.D. Akron; J. E. Thiel, Ph.D. Indiana; W. M. Williams, Ph.D. Rutgers.

5810 Energy Management: Theory and Practice (3) Management of energy resources in operating systems; decision criteria, trade-offs, system analysis, energy audits, technical parameters, conservation methods, worldwide energy supply and demand, new energy technologies.

6000 Doctoral Research and Dissertation

6110 History of Management Thought (3) Significant historical ideas leading to present state of art of management.

6120 Advanced Organizational Theory (3) Analysis of operational environment of international business firms and impact of internal and external factors on managerial decisions. Readings and cases.

6150 Energy Management: Theory and Practice (3) Management of energy resources in operating systems; decision criteria, trade-offs, system analysis, energy audits, technical parameters, conservation methods, worldwide energy supply and demand, new energy technologies.

6380 Seminar in Industrial and Organizational Psychology (3) (Same as Psychology 6380.)

6900 Field Work in Industrial and Organizational Psychology (1-3) Supervised practice. One credit hr for each 30 hrs of such practice. Maximum 15 credits. (Same as Psychology 6900.)

Management Science

MAJOR DEGREE

Management Science

Ph.D.

Associate Professors:
C. O. J. Allen, Ph.D. Yale; R. S. Gartlinsk, Ph.D. Johns Hopkins.

Assistant Professor:
R. E. Rosenthal, Ph.D. Georgia Institute of Technology.

Management Science Committee:
Members of the Management Science faculty and in addition: R. W. Boling, Management; J. E. MacBaby, Marketing; R. L. Church, Civil Engineering; E. Moshin, Economics; S. Kroll, Computer Science; R. E. Shires, Finance; C. W. Vesper, Statistics.

* William B. Stokely Professor of Management.

* Alumni Distinguished Service Professor.
There is no foreign language requirement.

These requirements generally are completed by the end of the first year of the program.

Preliminary Examination. Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written preliminary examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation. The student must complete 36 quarter hours of Management Science 6000, Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the 72 hour load of course work, normally is completed in the third year of the program.

5000 Thesis

5022 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5100 Introduction to Management Science Techniques (3) Review of matrix algebra and an introduction to techniques such as mathematical programming, decision theory, and queuing theory. Prereq: Statistics 5311. Not to be taken for credit by students who receive credit for 5310.


5355 Mathematical Programming Computational Systems (2) Practical aspects of using state-of-the-art mathematical programming systems. Students will write computerized matrix generation and report writing software for specific applications.

5340 Application of Management Science Methods (3) Application of methods from 5310-20-30 to large-scale management problems. 5350 may be taken concurrently.

5810 Special Topics in Management Science (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5910 Management Science Problems (1-3) Directed study on subject of mutual interest to student and staff member.

6000 Doctoral Research and Dissertation

6110-20-30 Models for Production Systems (3, 3, 3) Seminar in written preliminary examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

6210-20 Network Flows (3, 3) In-depth treatment of widely applied network optimization algorithms including transportation and transshipment; primal-dual and gradient methods: multicommodity, multiterminal and dynamic flows; flow with gains; and other advanced topics. Prereq: Mastery of 18 quarter hours in mathematics course work, a thorough background in mathematics, statistics, and computer science, and proficiency in a computer language.

6410 Large Scale Mathematical Programming (3) Development of solution strategies for linear programming problems that have many constraints, many variables, and often arbitrary constraint matrices. Prereq: 5310 or equivalent.

6510 Nonlinear Optimization (3) Solution of constrained and unconstrained nonlinear optimization problems by gradient, penalty, and quasi-Newton methods. Prereq: 5310 or equivalent.

6610 Markovian Decision Models (3) Formulation and analysis of Markov chain models; Markov chain models which incorporate decisions—their formulation, application and solution through policy iteration. Stochastic dynamic programming models in continuous time. Prereq: 5330.

6620 Queuing Models (3) Application and mathematical analysis of models of congestion. Basic birth-death process models, other Markovian models: non-Markovian models for systems with general service or arrival patterns, priority customers or other complicating assumptions; queues in series. Prereq: 5330 or Mathematics 4750-60.

6710 Location Models (3) Application of linear, nonlinear and network optimization techniques to problem of optimal location of new facilities. Prereq: 5310 or equivalent.

6810 Special Topics (3) Prereq: 5350-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

6910-20 Management Science Seminar (1-3, 1-3) Subjects selected from current management science literature.

Marketing and Transportation

G. N. Dicer (Head), DBA Indiana.

Marketing

Professors:

Associate Professors:
D. J. Barnaby, Ph.D. Purdue; J. R. McMillan, Ph.D. Ohio State; R. C. Reizenstein, Ph.D. Cornell; G. D. Sentell, DBA Indiana.

Assistant Professors:
F. L. Barbour, Ph.D. Illinois; E. R. Cadotte, Ph.D. Ohio State; R. L. Jenkins, Ph.D. Ohio State; R. L. Sprou, Ph.D. Georgia.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5005 Survey of Marketing (3) Analysis of marketing structure, institutions, functions, and marketing problems. Current trends and developments are acquired by studying cases and past practices. Prereq: 5350.

5200 Marketing Management (3) Management of basic marketing functions: customer needs and marketing decision simulation. Prereq: 5005 or equivalent.

5210 Sales Force Management (3) Basic communication theory variables, objectives and problems of sales force management. Recruitment,
selection, training, motivation, evaluation, and control of sales force; sales forecasting, territorial design, and routing. Prereq: 5200 or equiv.

5220 Promotion Management (3) Management of promotional activities within firm: advertising, publicity, and sales promotion. Emphasis on advertising, setting objectives, budgeting, segmentation, children's television advertising, international marketing issues, marketing channels, and related issues. Prereq: Consent of instructor.

Transportation and Logistics


Assistant Professor: J. H. Foggia, DBA Indiana.

5000 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered in any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5050 Survey of Transportation and Logistics (3) Logical demands made by society and specific users upon nation's transportation system and problems involved in distribution of goods, including regulation, pricing, and environmental issues. Prereq: 5210, Statistics 5311.


5120 Management and the Pricing Problem (3) Analysis of regulatory actions in marketing decision making problems. Prereq: Consent of instructor.


5220 Physical Distribution Strategy (3) Development and administration of basic logistical policies. Emphasis on rational distribution of products. Prereq: 5200 or equivalent.

5250 Buyer Behavior Analysis for Marketing (3) Buyer behavior patterns with emphasis on implications for marketing analysis and executive action. Prereq: Consent of instructor.

5300 Marketing Research (3) Investigation and solution of problems; application of research methods to functional areas of marketing. Prereq: Consent of instructor.

5350 Buyer Behavior Analysis for Marketing (3) Buyer behavior patterns with emphasis on implications for marketing analysis and executive action. Prereq: Consent of instructor.

5400 Analyzing Market Opportunity for Marketing Decision (3) Basic determinants of opportunity within markets, framework for identifying and organizing information required to assess market opportunity, consideration of alternative strategies. Coordination and control of marketing activities. Prereq: 5300 and 5350.

5410 Marketing Strategy (3) Components of marketing strategy including development of marketing mix and channel interrelationships. Public policy, cost and efficiency, and innovation in marketing policies. Prereq: Consent of instructor.


5900 Research in Marketing (3) Directed research on subject of mutual interest to student and staff member. Prereq: 12 hrs in transportation. May be repeated. Maximum 6 hrs.

6000 Doctoral Research and Dissertation

6059 Macro/Theoretical Foundations of Marketing (3) Fundamental nature and history of marketing processes. Role of marketing in developing and maintaining market economies. Prereq: 5100. 3 hr periods.

6100 Design and Measurement in Marketing Research (3) Advanced design and measurement issues. Theoretical scaling considerations, applications of multidimensional scaling techniques, and conjoint analysis. Prereq: Consent of instructor.

6150 Marketing Research Applications (3) Application of quantitative research tools to functional areas of marketing. Prereq: Knowledge of multivariate analysis and consent of instructor.

6200 Buyer Behavior (3) Behavioral processes of individuals and groups in roles as buyers of goods and services. Prereq: Consent of instructor.

6250 Selected Problems in Consumer Behavior (3) Information search processes, attitude models, attitude theory, and consumer satisfaction. Prereq: Consent of instructor.

6300 Marketing Decision Models (3) Model building process including application of variety of models to marketing decision making. Bayesian analysis, simulation, brand switching models, stochastic models, dynamic models, and mathematical programming models. Prereq: Consent of instructor.

6350 Current Topics in Marketing (3) Specific topics will vary with each course offering, but could include: nonbusiness marketing applications, environmental issues, market segmentation, children's television advertising, international marketing issues, marketing channels, and related issues. Prereq: Consent of instructor.

5011 Problems in Lieu of Thesis (3)

5050 Data Processing in Business (3) Fundamentals of data processing, computer program-
Statistics

MAJOR DEGREE
Statistics M.S.

Professors: C. C. Thiaghen (Head), Ph.D. Virginia Polytechnic Institute, D. S. Chambers, MBA Texas; R. A. McLean, Ph.D. Purdue.

Associate Professors: H. A. Laxter, Ph.D. Rutgers; J. W. Philpot, Ph.D. Virginia Polytechnic Institute; R. D. Sanders, Ph.D. Texas; D. J. Wheeler, Ph.D. Southern Methodist; M. S. Younger, Ph.D. Virginia Polytechnic Institute.

Assistant Professors: G. B. Ramsey, Ph.D. North Carolina State; S. W. Ward, Ph.D. Georgia Institute.

THE MASTER'S PROGRAM

The M.S. program in Statistics is designed to provide students a basic foundation in theoretical and applied statistics for meaningful careers as consulting and practicing statisticians. A candidate should possess an undergraduate degree with a strong background in calculus, but no restrictions are imposed regarding the undergraduate major. The typical Master of Science degree program in Statistics is as follows:

<table>
<thead>
<tr>
<th>Statistics Major Area</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability theory</td>
<td>3</td>
</tr>
<tr>
<td>Theory of statistical inference</td>
<td>6</td>
</tr>
<tr>
<td>Additional coursework in statistics as approved by the student's committee</td>
<td>9</td>
</tr>
<tr>
<td>Additional coursework as approved by the student's committee</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minor Area</th>
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</thead>
<tbody>
<tr>
<td>Selected with the approval of both Department of Statistics and the department in which the work is to be taken</td>
</tr>
<tr>
<td>Thesis*</td>
</tr>
<tr>
<td>Total minimum hours</td>
</tr>
</tbody>
</table>

Statistics courses numbered 4000 and above presuppose familiarity with the basic probability distributions in statistics and with the general concepts of statistical estimation and hypothesis testing. Students unfamiliar with these concepts should seek advice from a statistics advisor concerning prerequisite course work.

3450 Statistics for Engineering (3) Survey of statistical methods with special application for engineering students; frequency distributions, selected sampling distributions, some tests of significance. Cannot be taken for credit concurrently with 2100. Prereq: Mathematics 2840.

4250 Nonparametric Methods (3) Measures of association, two-sample tests, analysis of variance with ranked data, paired and multiple comparisons in preference testing; questionnaire evaluation.

4310 Regression Analysis (3) Linear regression and correlation, multiple regression, stepwise methods, polynomial regression, use of dummy variables. Use of standard regression computer programs. Elementary theory and applications.

4410 Design of Experiments (3) Principles and procedures for efficient experimental design. Randomization, choice of size and number of experimental units, utilization of blocking arrangements. Interpretation of experimental data.

4415 Sampling Techniques and Theory (3) Procedures used in probability sampling for a variety of arrangements of statistical universes and development of estimators and standard errors associated with the sampling schemes. Some properties of estimators. Determination of sample size. Not available for credit to students with credit for 3410.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only.


5110 Introduction to Probability Theory (3) Classical probability and distribution theory. Prereq: Elementary linear algebra and calculus of several variables.

5120-30 Theory of Statistical Inference (3, 3) Introductory theory underlying common statistical procedures of hypothesis testing and estimation. Prereq: 5110.


5211 Elementary Statistics (3) Introductory statistics for graduate students. Probability, sampling distributions, estimation, and hypothesis testing. Emphasis on interpretation and decision making. Not available for credit in any College of Business Administration degree program.


5311 Fundamental Concepts of Probability Theory (3) Probability axioms, discrete and continuous random variables, joint distributions, functions of random variables, expectation, and sampling distributions. Prereq: 1630 and 1860 or 2512 and one course in computer programming. May not be taken for credit by students who receive credit for 5110.

5312 Statistical Methods (3) Significance testing, applications of Chi-square statistic, analysis of variance, least squares, and linear regression. Prereq: 5311.

5610 Special Topics in Statistics (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6060 Applied Multivariate Analysis (3) Canonical correlation; discriminant analysis for several groups, and for equal and unequal covariance matrices; principal component analysis; Hotelling's T²; multivariate analysis of variance and covariance. Prereq: 1 yr applied statistics including analysis of variance and multiple regression analysis.

6070 Factor Analysis (3) Principal component analysis and principal factor analysis; estimates of communalities; methods of rotation; interpretation of factors; cluster analysis. Prereq: 6060.

6210 Stochastic Processes II (3) Special analysis, time series, linear and nonlinear systems. Prereq: 5210.
The College of Communications offers two graduate degrees with a major in Communications, the Master of Science (M.S.) degree and the Doctor of Philosophy (Ph.D.) degree. In addition, communications is available as a minor for students majoring in other departments. Required course work will be selected after discussion with the major advisor and an advisor from the College of Communications.

The College is accredited by the American Council on Education for Journalism. It is a member of the American Association of Schools and Departments of Journalism and the Broadcast Education Association.

MASTERS OF SCIENCE
The Master of Science degree with a major in Communications is offered for students who primarily desire (1) advanced preparation in effective communication for mass media and other fields of applied communication, or (2) a deeper understanding of the communication process and the social role of the mass media.

The prospective student who is interested only in acquiring basic skills in journalism, advertising, or broadcasting is advised to consider a second baccalaureate rather than an advanced degree. (Note: There is no M.S. in Journalism or Advertising or Broadcasting at this institution.) Students desiring a degree in one of these fields must take the B.S. program.

Applicants must meet admission requirements of the University Graduate School. In addition they must complete the Graduate Record Examination, the California Psychological Inventory, and application forms as required by the College of Communications. All application materials will be screened by an admissions committee authorized by the Graduate Studies Committee of the College of Communications.

New students may be admitted to the program at any time; however, beginning enrollment is limited to the summer and fall quarters each year. Unless necessary materials are received at least six weeks before registration, applications may not be processed in time for admission to full potential candidate status in the first quarter. In these cases, the student may still qualify for non-degree or post-baccalaureate status.

The student may choose either of two tracks, both leading to the M.S. in Communications and both requiring a thesis:

The academic track is designed for the student who wishes to emphasize advanced study of the theory and effects of communications. A minimum of 45 hours of approved graduate work is required:
- 12 hours of core courses: Communications 5100, 5120, 5140 and 6100, the first three of which must be taken during the first two quarters of the student's program, except with written approval of the Assistant Dean for Graduate Studies for the College. In addition, students who earned their baccalaureate degrees outside the field of Communications will normally be required to add Communications 5130 to their core;
- 24 hours of selected courses within the College, including at least 9 hours at the 5000 level;
- 9 hours of thesis work (Communications 5000).

The professional track is designed for the student who desires the graduate degree but wishes to emphasize a particular professional area, such as advertising, broadcasting, journalism, or public relations. A minimum of 45 hours of approved graduate course work is required:
- 9 hours of core courses: Communications 5100, 5120 and 5140, which must be taken during the first two quarters of the student's program, except with written approval of the Assistant Dean for Graduate Studies for the College;
- 15 hours in a major area within the College, including at least 6 hours at the 5000 level;
- 9 hours of thesis work (Communications 5000);
- at least 12 hours in a minor area approved by the major advisor, of which at least 6 hours must be at the 5000 level.

In addition, students with baccalaureate degrees in other cognate areas will be required to complete prerequisites as designated by their advisors. Advising for the professional track will be supervised by the chairperson of the appropriate department of the College. Students who have had no courses in their major areas of concentration may expect to spend six or more full-time quarters in the program. After the formal program of courses and research in either track is completed, the student must pass an oral examination conducted by his/her graduate committee. Communications majors in the M.S. program must demonstrate ability to use a typewriter proficiently within their first quarter in residence.

DOCTOR OF PHILOSOPHY
The Ph.D. degree with a major in Communications is intended to prepare scholars for teaching, research, administration, and service in the field of human communications. The program is interdisciplinary, consisting of a required core curriculum and recommended emphasis outside the...
College in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. The Master's degree is not required for entry into or completion of the doctoral program. Program planning, however, will permit the Master's degree to be earned if desired. Students lacking academic or professional experience in communications will be required to take prerequisite courses. In general, however, the program may be completed within three academic years of full-time study beyond the Bachelor's degree.

The following are normally minimal requirements for admission to full potential candidate status: (a) a 3.0 (4.0 system) grade point average in undergraduate studies, or 3.5 for graduate work; applicant holds a Master's degree; (b) above the fiftieth percentile in verbal and quantitative aptitude on the Graduate Record Examination; (c) completion of the California Psychological Inventory; (d) endorsement by at least three former teachers or professional colleagues chosen by the Graduate Studies Committee; (e) a statement of the applicant's ability and motivation for pursuing the doctorate. Personal interviews with members of the Graduate Studies Committee may be required. Professional experience in a specific field of communications is a highly desirable criterion for admission.

The following program represents work normally required for an individual with only the Bachelor's degree and no technical competence: (1) prerequisite courses offered by the College of Communications and approved by the major advisor for applicants lacking the necessary academic and/or professional background; (b) core curriculum: 33 hours of course work; (c) primary concentration in communications: 15-18 hours of course work; (d) secondary concentration in a cognate minor subject normally outside communications: 12 hours of course work; (e) technical competence area in either teaching, research, or administration: 15-18 hours of course work and, for those who lack appropriate professional experience, an internship the equivalent of 9 credit hours; (f) research tool: 12 hours of course work, e.g., statistics, foreign language, or computer science; (g) dissertation: 36 hours of Communications 6000.

The following courses represent the required core curriculum (beyond the Bachelor's degree).

Communications 5100, Introduction to Graduate Studies
Communications 5120, Research Methods
Communications 5140, Communications Theory
Communications 6100, Seminar in Communications Theory
Communications 6000, Seminar in Communications Topics

One of the following:Communications 6300, Survey Research Methods in Communications; 6310, Experimental Research Methods in Communications; 6320, Seminar in Historical Research Methods in Communications.

For the teaching or administrative technical competence area: a one-week, non-credit computer program course and Statistics 5211, or Sociology 5320 and Statistics 4250; for the research technical competence area: Statistics 5050 and 5060.

Continuing and Higher Education 5450, Instruction in Higher Education.

Management 5110-20, Organization Theory I and II (or equivalent courses approved by committee).

Admission to candidacy must be attained at least three quarters prior to graduation and requires successful completion of a preliminary examination.

REQUIRED SCHOLASTIC AVERAGE

A student in the College of Communications whose graduate grade point average, not including incomplete grades, is below 3.0 at any time after the end of 12 hours of graduate credit will be placed on probation. A student on probation will be dropped from the program unless his or her cumulative graduate grade point average is 3.0 or higher at the end of the probation period. The probationary period is defined as the next 12 quarters of graduate course work attempted which is specified in the student's degree program. Exceptions to this policy may be made only with the approval of the Assistant Dean for Graduate Studies of the College of Communications upon the recommendation of the student's faculty committee.

Communications Research Center

The Communications Research Center is a vital adjunct to the communications graduate program. Objectives of the Center are: (a) to conduct original research in mass and public communication; (b) to disseminate research-generated information; and (c) to provide research services to faculty and students, professional communicators, and others interested in improving the quality of human communications.

Departments of Instruction

Numbers in parentheses following the course titles indicate quarter hours credit offered.

Communications

MAJOR

DEGREES

Communications

M.S., Ph.D.

Professors:

J. B. Haskins, Ph.D. Minnesota; D. G. Hileman, Ph.D. Illinois; D. W. Hoff, Ph.D. Northwestern; J. R. Lynn, Ph.D. Southern Illinois.

Associate Professors:


5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5100 Introduction to Graduate Studies (3) Scope and methods of advanced study in communications. Information sources, literature review methods, scholarly standards, research requirements and procedure, overview of traditional and behavioral research methods.

5120 Research Methods (3) Communications research strategies and methodology process, bases for derivation and verification of hypotheses, and basic methods of designing research communication samples.

5130 Advanced Principles of Mass Communications (3) Proceedings covering all phases of mass communications including history, development and current status of communication industry, principles of broadcasting, and principles of advertising.

5140 Communications Theory (3) (Same as Speech 5140).

5150 Seminar in Communications Issues (3) Contemporary topics in communications. Pre-req: 5100 and 5140, or consent of instructor. May be repeated. Maximum 6 hrs.

5970 Independent Study (3) Reading, research, or projects on special topics in communication. On individual basis, under faculty direction, with consent. May be repeated.

6000 Doctoral Research and Dissertation

6100 Seminar in Communications Theory (3) Intensive analysis of selected theories and supporting research data dealing with source, message, media, receiver, or situational variables in the process of communication. Pre-req: 5140. Recommended: 5100.

6200 Seminar in Communication Topics (3) Intensive analysis of special issues and problems in human communication. Each term will cover specific professional area, e.g., international communication, public service communication, political communication. Pre-req: 5100. Recommended: 5140. May be repeated.

6300 Survey Research Methods in Communications (3) Survey methods applied to opinion and communications media research problems. Planning, sampling, questionnaire construction, data gathering (personal, mail, and telephone), data processing and interpretation. Attitude measurement and message pretesting applications. Prereq: 5100 or consent of instructor.

6310 Experimental Research Methods in Communications (3) Experimental methods applied to communications research problems. Causal inferences from various research designs. Control, single-factor, and factor experimental designs. Laboratory and field experiment situations. Pre-req: 5120 or consent or instructor. Pro-req or coreq: Basic statistics.

6320 Seminar in Historical Research Methods in Communications (3) Materials and methods in historical, descriptive, and legal research in communications theory and behavior. Pre-req: 5100, 5140; Recommended: 5140, 6100, and Speech 5450.

Advertising

Professors:

R. Joel (Head), M.A. Wisconsin; D. G. Hileman, Ph.D. Illinois.

Associate Professors:

A. D. Fletcher, Ph.D. Illinois; S. K. Zeigler, Ph.D. Michigan State.

Assistant Professor:

D. S. Bagley, Ph.D. Tennessee.

3530 Advertising Copy and Layout (4) Ideas and their translation into persuasive words and pictures. Principles and techniques of copy and
4000 Advanced Advertising Copy and Layout (4) Creative strategy and execution of advertisement for mass media. Problems in idea creation for the development of print and broadcast. Prereq: 3000 or Marketing 4150.

4380 Advertising Media (3) Media, markets, and audiences. Evaluation of media in relationship to communication needs of advertisers. Prereq: 3000 or Marketing 4150 or consent of instructor.

4460 Advertising Cases and Problems (3) The case approach to the study of advertising problems. Analysis of campaigns and trends. Prereq: 4000 and 4360 or consent of instructor.

4470 Advertising Campaigns (4) Application of theory in planning and execution of campaigns. Market and consumer research; development and allocation of budgets. Choice of appeals and approaches; media selection; preparation of advertisements. Prereq: 4000 and 4360 or consent of instructor.

5310 Current Issues in Advertising (3) Current socioeconomic, ethical and cultural issues in advertising and communication to determine advertising's role in and responsibility toward society. Emphasis on both marketing and behavioral science aspects of advertising. Conducts seminars of management, research and education. Individual reading or research; preparation and delivery of papers.

5350 Advanced Advertising Research (3) Nature, research design, research measurement of advertising, media audiences, and evaluation of messages. Prereq: 4460 or consent of instructor.

5510 Creative Projects (3) Creative or problem-solving projects related to advertising. Designed for the advanced student who wishes to apply theory and skills to specific problems. Prereq: 5570 or 4620 or consent of instructor. May be repeated.

5700 Independent Study (3) Broadcasting

Professor: D. W. Holt (Head), Ph.D. Northwestern.

Associate Professors: H. H. Howard, Ph.D. Ohio; I. G. Simpson, M.S. Syracuse.

Assistant Professors: F. A. Lester, M.A. Tennessee; R. A. Shirley, M.A. Missouri; M. K. Sider, Ph.D. Northwestern.

3360 Television and Radio Advertising (3) Principles of successful radio-television advertising; emphasis on media research, rate structure, programming, creativity, television commercials.

3650 Radio-Television Writing (3) Theory and technique of writing broadcasting scripts except news and documentaries. Special events, interviews, musical scripts, radio talks, documentaries, and promotion material.

4010 Speech for Broadcasting (3) Fundamental broadcast conditions affecting the announcer; preparation and oral interpretation of general American speech; Spanish, Italian, German, and French pronunciation. Prereq: Strongly recommended but not mandatory. Prereq 2120, 3002.

4220 Radio Production (3) Study of radio productions, past and present. Familiarization with production tools and techniques. Group and individual production activities. Prereq: 2750 or consent of instructor. Cannot be taken for graduate credit by communications majors.

4030 Television Production (3) Overview of elements of television production: cameras, sound, lighting, film, videotape recording, editing, and studio control centers. Presented with the layman and professional broadcast student in mind. Prereq: 4000 or consent of instructor. Cannot be taken for graduate credit by communications majors.

4040 Advanced Television Production (3) A semi-independent course in program origination, producing, editing, and transmitting with orientation to the professional broadcast student. Prereq: 4030 or consent of instructor.

4610 Broadcast News Operation (3) Theory and practice in covering local news and public affairs events for radio and television. Gathering and production of news broadcasts, using tools of broadcast newsgathering. Prereq: 3610 and 3670 or consent of instructor. 2-2.5 hrs and 1 lab.

4670 Radio-Television Management (3) Business policies and practices of networks and stations. Departmental functions, cost and income figures, sales techniques, promotion, advertising agencies, and governmental regulations. Lectures by commercial broadcasters. Prereq: 2750 or consent of instructor.

4680 Broadcast Sales Management (3) Problems and practices of television and radio sales, case studies in sales development pricing, promotion, and other areas of sales management. Prereq: 4000 and 4360 or consent of instructor.

4510 Educational Broadcasting (3) Summary, analysis, application, and evaluation of television and radio broadcasting for educational purposes.

5150 Creative Projects (3) For students having specialized broadcasting interests or who wish extensive directed study in creative writing or production projects. May be repeated.

5610 Public Affairs Broadcasting (3) News and public affairs function in broadcasting stations and networks, including management, economics, personnel utilization, sources of program materials, ethical and legal aspects. Public affairs program development, particularly in conferences, interviews, and news specials. Prereq: 4360 or consent of instructor.

5200 Broadcast Law and Regulations (3) Socio-political control of broadcasting; effect of laws, regulations, and public pressures upon station policies. Emphasis on unique situations of broadcasting among media in terms of regulation. Prereq: Journalism 4410 or 5210 or consent of instructor.

5530 Broadcast Documentary Writing (3) Role of documentary in radio and television. Research, writing, and critique of documentary programs.

5850 Radio-Television Program Development (3) Planning, production, and format for broadcasting stations. Historical trends in programming and current programming practices as related to audience requirements, governmental policy, and competitive conditions. Individual studies of program development on both local station and network levels. Prereq: 2750 or consent of instructor.

5790 Independent Study (3)

School of Journalism

Professors: D. C. Cade, Ph.D. Iowa; J. B. Haskins, Ph.D. Minnesota; J. Hohenberg, B. Litt. Columbia; J. A. Leiter, Ph.D. Southern Illinois; R. Lynn, Ph.D. Southern Illinois.

Associate Professors: J. A. Crook (Director), Ph.D. Iowa State; J. N. Adamson, M.S. Tennessee; G. A. Everett, M.S. Minnesota; J. Hohenberg, B. Litt. Columbia; J. B. Haskins, Ph.D. Michigan; J. A. Leiter, Ph.D. Southern Illinois; R. Lynn, Ph.D. Southern Illinois.

Assistant Professor: P. G. Ashdown, Ph.D. Bowling Green.

3210 Writing Feature Articles (3) Instruction and practice in writing articles for newspapers, trade journals, and magazines. Market analysis and free-lance selling. Prereq: 2210 or consent of instructor.

3410 Communications Law (3) Statutory law and judicial precedents affecting mass communications media. Libel, contempt of court, invasion of privacy, copyright, broadcast, programming, and postal regulations.

3560 Investigative and Specialized Reporting (3) Investigative and interpretative reporting of complex or specialized subjects to place news in perspective. Prereq: Journalism 4010 or consent of instructor. Emphasis on writing for publication. Prereq: 2220.

3710 Public Relations (3) Theories and principles of public relations. Overview of PR as a management tool of business, government, institutions, and organizations. Cannot be taken for graduate credit by communications majors.

3720 Public Relations: Advanced (3) Public relations organization, techniques and tools. Preparation of communications materials to gain support from target publics. Prereq: 3710.

3730 Public Relations Cases (1) Case studies and application of public relations principles to problems in business and industry, government, institutions, organizations, trades and professions. Prereq: 3720.

3810 Specialized Publications (3) Business and individual publications, advertising copy; buying and placing advertisements on newspapers and magazines in such fields as agriculture, politics, labor, finance, science, technical as well as general publications. Prereq: 2220 or 2230.

4810 Journalism in the High School (3) Functions and methods of high school publications. Staff organization, writing and editing techniques, editorial problems, and business management.

4910 News and Feature Photography (3) Advanced principles and methods in black-and-white and color photography. Emphasis on news and feature photographs, and picture stories. Prereq: 3910 or consent of instructor.

4950 International Communications (3) Communication and technology; individual projects on and under varying types of political and economic systems; world news organizations; the press as a factor in international affairs; barriers to the flow of information; comparison of world press systems.

4990 Problems in Research (3) An independent work course. Intensive study of some phase of the major field, investigative procedures, report writing.

5210 Government and the Press (3) Historic and current problems in the relations of executive, judicial, legislative, and regulatory branches of government and press. Prereq: 3110 or consent of instructor.

5250 Public Opinion and Mass Media (3) Nature of public opinion with emphasis on role of press in its formation and how the press in turn is influenced by public opinion. Prereq: 4410 or consent of instructor.

5510-20-30 Writing and Editing Projects (3,3,3) Specialized writing or editing interests, such as agriculture, politics, labor, finance, science, technical as well as general publications. Prereq: 2220 or 2230.
5560 Magazine Article Writing (3) Techniques of writing in-depth articles for mass circulation magazines. Organizing and presenting material. Problems in specialized areas, such as business, science, agriculture, the humanities. Prereq: 3120 or consent of instructor.

5710 Studies in Public Relations Communications (3) Problems of communication between institutions and organizations and their publics. Case histories and evaluations of programs. Prereq: 3710 or consent of instructor.

5810 Magazine Editing and Production (3) Analysis of editorial and production problems of general, regional, and specialized publications. Reader interest evaluation. Individual editorial projects. Prereq: Consent of instructor.

5950 Communications and International Development (3) Seminar emphasizing mass media in national and international development. Communications and change in developing countries. Problems in international and cross-cultural communications. Prereq: 4950 or consent of instructor.

5970 Independent Study (3)
The faculty of the College of Education is committed to performing three major functions: (1) to provide professional preparation for teachers, administrators, and school service personnel at undergraduate and graduate levels; (2) to collaborate with school personnel, educational agencies, professional groups, and others interested in the evaluation and improvement of educational opportunities, programs, and services; and (3) to promote and conduct experimental and research studies in education.

The College of Education holds membership in the American Association of Colleges for Teacher Education. All certification and degree programs through the doctoral level are fully accredited by the National Council for Accreditation of Teacher Education, the Southern Association of Colleges and Schools, and the Tennessee State Department of Education.

The College of Education, through the Graduate School, offers programs leading to the Master of Arts in College Teaching, the Master of Science degree, the Specialist in Education degree, and the Doctor of Education and Doctor of Philosophy degrees.

MASTER OF SCIENCE

On the Master's level professional study may be planned (1) in one of the areas listed on page 8, (2) in appropriate combinations of these areas, or (3) in combinations of one or more of these areas with appropriate subjects or areas in other colleges.

SPECIALIST IN EDUCATION DEGREE

This degree may be earned in Educational Administration and Supervision, in Educational Psychology and Guidance, in Curriculum and Instruction, in Safety Education and Service, or in Vocational-Technical Education.

DOCTORAL DEGREES

The College of Education offers programs of advanced study leading to the Doctor of Education degree in the major areas listed on page 8, and to the Doctor of Philosophy degree in Health Education.

Bureau of Educational Research and Service

Four major types of activities—research, development, educational services, and publications—are channeled through the Bureau of Educational Research and Service (BERS), located in Claxton Education Building. The research activities relate to the development of research proposals, conducting research, and assisting others in development of research proposals in the College of Education. Developmental activities relate to change efforts in curricular content and instrumental methodology. Educational services include a wide list of activities such as in-service educational programs, consultant services, and administrative training programs. Official publications of the College of Education are developed through the Bureau. A limited number of graduate student assistantships are available.

The Educational Opportunities Planning Center and the School Planning Laboratory are integral parts of the Bureau of Educational Research and Service.

EDUCATIONAL OPPORTUNITIES PLANNING CENTER

The Educational Opportunities Planning Center (EOPC) works with school districts in the Tennessee-Kentucky area to help meet their desegregation and sex discrimination needs by assisting with needs assessment and by helping develop plans to meet the needs. Staff members provide in-service training for local district personnel. Such training is directed toward solutions of curricular, human relations, and other types of problems created or compounded by school desegregation and sex discrimination. On-site evaluation of locally installed practices and continuing cooperative evaluation of the progress of local programs are additional major efforts. This program is funded by the U.S. Office of Education.

SCHOOL PLANNING LABORATORY

The School Planning Laboratory (SPL), located in Claxton Education Building, assists schools and colleges in integrating curriculum offerings with architectural designs, organizing regional institutes to promote innovative construction concepts, encouraging full staff utilization to secure an optimal learning environment, facilitating renovative projects within existing buildings, and conducting custodial clinics on proper maintenance techniques. Course work relating specifically to school planning is offered through the Department of Educational Administration and Supervision, while two-year graduate assistantships are under the administrative auspices of the Laboratory.

Departments of Instruction

Numbers in parentheses following the course titles indicate quarter hours credit offered.
Art and Music Education

Charles H. Ball, Head

Art Education

MAJOR
Art Education

DEGREE
M.S.

Professor: J. W. Robertson, Ed.D. Columbia.

Associate Professor: H. N. Huff, Ed.S. Peabody.


The Master of Science Degree in Art Education is offered for art teachers, supervisors, and art-trained persons holding the baccalaureate degree. The program provides both thesis and non-thesis options. Moreover, it is possible to achieve Tennessee Certification in art while pursuing the Master's degree program.

The thesis option requires 45 quarter hours as follows:

Quarter hours
1. Art Education 5310, 5320, and electives ........................................................................... 18
2. Education Curriculum and Instruction 5710, and electives .......................................... 9
3. Minor (selected with committee) ......................................................................................... 9
4. Thesis (Art Education 5000) .................................................................................................. 9

The non-thesis option requires 45 quarter hours as follows:

Quarter hours
1. Art Education 5210, 5310, 5320, and electives ................................................................. 21
2. Education Curriculum and Instruction 5800, and electives ........................................... 9
3. Minor (selected with committee) ......................................................................................... 9
4. Electives .................................................................................................................................. 6

The thesis option requires satisfactory completion of an oral examination prior to awarding the degree, while the non-thesis option requires satisfactory completion of a final written comprehensive examination. Both the oral and written examinations are conducted by the student's Master's degree committee.

Not all courses in art education are offered regularly each quarter, so the student should plan his or her program carefully with a faculty advisor.

3210 Art in the Secondary School Program (3)
Program planning; materials and equipment; relation to other school experiences. Classroom observation. Prereq: 9 hrs art education, 1 hr and 2 labs.

3920 Clay in School Program (3)
Exploring methods of hand-built forms, glazing and firing procedures. Prereq: 2100. 1 hr and 2 labs.

3930 Textile in School Program (3)
Exploration of processes of weaving, stitchery, batik, and silk screen. Prereq: 2100. 1 hr and 2 labs.

4120 Designing Teaching Aids for Art in School Program (3)
Design and preparation of charts, exhibitions, slides, films, and other teaching aids for art grades one through twelve. Prereq: 2100 or consent of instructor. 1 hr and 2 labs.

4130 Three-Dimensional Design in School Program (3)
Exploration of wood, wire, metal, plastics, and other sculptural materials. Prereq: 2100 or consent of instructor. 1 hr and 2 labs.

4150 Lettering, Posters, and Displays in the School Program (3) Design and layout; techniques and procedures. Prereq: 2100 or consent of instructor. 1 hr and 2 labs.

4160 Appreciation of the Arts in the School Program (3) Prereq: 2100 or consent of instructor. 1 hr and 2 labs.

4350-60-70 Problems in Art Teaching (3, 3, 3) Prereq: Consent of instructor.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and for a total time before degree is completed. May not be used toward degree requirements. May be repeated. S/U only.

5210 Organization, Administration, and Supervision of Art in the School Program (3)

5310 Art in Education (3) Historical background, current philosophy, theory, and trends; nature and function of aesthetic behavior in visual arts; relationships to psychology, sociology, and anthropology.

5320 Program Development in Art Education (3)
Objectives, organization, content selection, facilities, and equipment; supervision, evaluation; professional growth; leadership and community relationships; art for special student.

5850-60-70 Problems in Art Education (3, 3, 3) Prereq: Consent of instructor.

Music Education

MAJOR
Music Education

DEGREE
M.S.

Professor: C. H. Ball (Head), Ph.D. Peabody; A. W. Humphreys, Ed.D. Illinois; W. J. Julian, Ph.D. Northwestern.


Assistant Professor: M. C. Moore, Ph.D. Michigan.

Thesis and non-thesis programs lead to the Master of Science degree in music education. Prerequisite preparation: undergraduate degree or equivalent in music education.

All graduate students in music education must pass proficiency examinations in music theory and applied music.

Requirements for thesis program: 45 quarter hours including thesis (9 hours), the music education major (18 hours), minor areas in music (9 hours), and professional education (9 hours). Required courses: Music Education 5000, 5210, 5220, 5230; Curriculum and Instruction 5710.

Requirements for non-thesis option:
1. Minimum of 51 quarter hours of course work with a minimum of 26 hours at the 5000 level.
2. Evidence of ability to understand and interpret research through completion of:
   a. Curriculum and Instruction 5610 or equivalent.
   b. Music Education 5710.
3. Satisfactory performance of research activities in required courses in music education listed below.
   a. Curriculum:
      a. A major: at least 27 quarter hours in music education.
      b. A minor: at least 15 quarter hours in music.
   c. 9 quarter hours in professional education, including Curriculum and Instruction 5610 and Educational Psychology 4760 or equivalents and a 3-hour elective.

With the exception of the required courses listed and with approval of the student's advisor, courses may be selected as described more fully above. This provides the flexibility necessary for the student to pursue in some depth specialized interests and needs in the following areas of music teaching:
   a. Elementary; Secondary (Junior and Senior); Vocal (Choral); Instrumental (Band and Orchestra); and Supervision.

4. Specific course requirements:
   a. Music Education Foundation (15 quarter hours):
      1. One seminar (3 hours)
      2. 5210, Psychological Foundations of Music
      3. 5240, Evaluation Procedures in Music Education
      4. 5250, The Role of Music in Education
      5. 5710, Research in Music Education
   b. Music: Six quarter hours in applied music (piano, voice; a band or orchestra instrument; or theory and composition)
   c. Education (limited elective of 6 quarter hours): Educational Psychology 4760, Advanced Child Study; or 5050, Children and Adolescents. 5320 Advanced Classroom Behavior Modification; or another appropriate course in educational psychology with 3 hours credit.
   5. Electives (with approval of advisor):
      a. Music Education: 12 credit hours from courses numbered 5000.
   b. Music: 9 credit hours from courses at the 3000, 4000, or 5000 levels. No courses required in the undergraduate curricula may be included.
   c. Education: 3 credit hours, elected from other departments in Education.
   6. Evaluation (in addition to routine examinations in courses):
      a. Written comprehensive examination in major and minor fields.
      b. The student shall elect one of the evaluation procedures below (with approval of advisor):
         1) Oral examinations in major and minor fields.
         2) A public recital in principal instrument, piano, or voice.
      3. The presentation in public performance of an original musical composition(s) accepted by the committee as music suitable for school music performing groups.
   4) Plan, rehearse and conduct a full public performance of music by junior or senior high school music groups. This shall be worked out as a long-term project under the supervision of the student's committee.
   5. Student's Committee: A minimum of three faculty members—the advisor from music education; one member from music; one member from education.

4441-42-43 Teaching Class Piano (1, 1, 1) For majors in music, music education, or elementary education. Prereq: Consent of instructor.


4660 Marching Band Techniques (3) Functions, organization, and direction of a school marching band.
5210 Psychological Foundation of Music (3) Perception; function; aesthetics; talent measurement; implications for teaching and practice. A review of classic and current experimental studies. Prereq: Consent of instructor.

5220 The Administration and Supervision of School Music (3) Improvement of teacher-learning, child-learning process in music education. Preparation for future teaching in elementary, junior high, and senior high curricula. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5230 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5240 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

Continuing and Higher Education

MAJOR DEGREE

Adult Education M.S.


Associate Professor: K. O. McCullough, Ph.D. Florida State.

Assistant Professor: W. D. Barton, Ed.D. Tennessee.

The Master of Science degree in Adult Education is offered for teachers, administrators, counselors, and community specialists. The degree program has two options. A thesis option requires research and teaching of music in secondary school; 4430 and 3420 or equivalent. The thesis option requires research and teaching of music in secondary school; 4430 and 3420 or equivalent.

5360-70-80 Problems in Continuing and Higher Education (1-3,1-3, 1-3) Supervised practice in selected areas of instruction or administration of continuing or higher education programs. S/NC only.

5410 Advanced Band Literature and Conducting (3) Preparation in conducting and interpreting musical scores suitable for school, college, church, and community bands; emphasis on contemporary and standard major chorale works. Prereq: Undergraduate degree in a major in music or music education; 4450, 4510 or equivalent.

5430 The Talent Education Program of Shinichi Suzuki (2, 2) Study of the psychology, evaluation procedures, including accreditation activities. The degree program has two options. A thesis option requires research and teaching of music in secondary school; 4430 and 3420 or equivalent.

5430 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5450 Adult Education: A General Survey (3) Theory and method for planning and organizing instruction in adult education. Prereq: Consent of instructor.

5460 College of Education—Tort Liability and Risk Management (3) Legal precedent concerning liability exposure of public institutions of higher education. Personal and institutional liability. Basic principles of risk management and liability insurance. Prereq: 5410 and 5420, or consent of instructor.

5470 The Curriculum of Undergraduate Higher Education (3) Background, content, and organization of instructional programs, trends, and educational procedures, including accreditation activities.

5480 American Higher Education (3) Functions, organizations, and programs.

5490 Instruction in Higher Education (3) Problems, procedures, and techniques.

5500 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.


5506 Adult Education: A General Survey (3) Historical development, philosophies of adult education, teacher preparation, and guidance. Consent of instructor.

5520 The Role of Music in Education (3) For school personnel, other than music teachers, on the role of music in public education. No previous music experience required.

5526 Music for Early Childhood (3) Prereq: 3120 or 3130 or consent of instructor.

5527 Studies of Music for Children in the Primary Grades (3) Children's growth processes in music for Grades 1-3, and musical experiences. Prereq: Undergraduate degree in education, teacher preparation, and consent of instructor.

5530 Advanced Choral Literature and Conducting (3) Reading, conducting, and interpreting musical scores suitable for school, college, church, and community groups; emphasis on contemporary and standard repertoire. Prereq: Undergraduate degree with a major in music or music education; 4450, 4510 or equivalent.

5535-60-70 Special Problems in Music Education (3, 3, 3) Current problems in music education at all levels of instruction and in various specialized areas of music curriculum. Prereq: 5710 or equivalent and consent of instructor.

5540 Advanced Band Literature and Conducting (3) Reading, conducting, and interpreting musical scores suitable for school, college, and community bands; emphasis on contemporary and standard major chorale works. Prereq: Undergraduate degree with a major in music or music education; 4450, 4510 or equivalent.

5550 Graduate Seminar in Program Planning (3) Theories of administrative and organizational structures in higher education. Personal and institutional liability. Basic principles of risk management and liability insurance. Prereq: 5410 and 5420, or consent of instructor.

5550 Governance of Colleges and Universities (3) Development, change, trends, policy, and organization of college and university administration.

5552 Fiscal Problems in Higher Education (3) Revenue sources and fiscal management in public and private colleges and universities.

5560 Program Planning in Continuing and Higher Education (3) Background, content, and organization of instructional programs, trends, and educational procedures, including accreditation activities.

5560-70-80 Seminar in Continuing and Higher Education (1-3, 1-3, 1-3) Supervised practice in selected areas of instruction or administration of continuing or higher education programs. S/NC only.

5570-70-80 Seminar in Continuing and Higher Education (1-3, 1-3, 1-3) Supervised practice in selected areas of instruction or administration of continuing or higher education programs. S/NC only.

5580 The Community-Junior College (3) History and role of two-year college, major functions, organization and administration, problems, and issues.


5610 Research in Music Education (3) Prereq: Consent of instructor.

5610 Seminar (3) Music teaching in primary and intermediate grades. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5620 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5630 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5640 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.


5710 Research in Music Education (3) Prereq: Consent of instructor.

5710 Seminar (3) Music teaching in primary and intermediate grades. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5720 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5730 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5740 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.


5810 Seminar (3) Music teaching in primary and intermediate grades. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5820 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5830 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5840 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.


5860 The Community-Junior College (3) History and role of two-year college, major functions, organization and administration, problems, and issues.

5870-70-80 Seminar in Continuing and Higher Education (1-3, 1-3, 1-3) Supervised practice in selected areas of instruction or administration of continuing or higher education programs. S/NC only.

5880 The Community-Junior College (3) History and role of two-year college, major functions, organization and administration, problems, and issues.


5910 Seminar (3) Music teaching in primary and intermediate grades. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5920 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5930 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.

5940 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation areas of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.


Graduate programs are designed to improve scholarship and educational competence in a number of areas leading to the Master of Science degree, the Educational Specialist in Education, or the Doctor of Education degree.

THE MASTER'S PROGRAM

For the Master of Science degree, thesis and non-thesis options are available in the following majors: Curriculum, Elementary Education, English Education, Foreign Language Education, Instructional Media and Technology, Mathematics Education, Social Science Education, or Science Education. The non-thesis option requires the completion of 31 quarter hours of course work.

THE SPECIALIST PROGRAM

The Educational Specialist degree program with a major in Curriculum and Instruction will encompass concentrations in the following areas: Curriculum, Mathematics education, English education, foreign language education, instructional media and technology, mathematics education, science education, social science education, or science education.

The program includes a minimum of 90 hours of graduate study. If the student has earned the Master's degree, a maximum of 45 hours of the Master's work may be credited to the 90 hour Ed.S. requirement. (45 hours of 5000-level courses are required.) The program must also include the following:

1. At least 24 of the 90 hours must be taken in one of the eight areas listed above.
2. A minimum of 12 hours taken within the College of Education in areas other than the student's major area.
3. A minimum of 12 hours taken outside of the College of Education.
4. A minimum of 9 hours earned through the writing of a thesis. (Students who have written a thesis for the Master's degree may be exempted from a thesis in the Ed.S. program provided, in the judgment of the student's committee, the thesis meets the standards of research appropriate for the Ed.S. degree.)
5. A minimum of 45 elective hours taken according to a plan jointly developed by the student and the major professor in terms of the student's professional goals.

THE DOCTORAL PROGRAM

The doctoral major in Curriculum and Instruction may include emphasis upon the following fields: curriculum, social foundations, educational research, elementary education, English education, foreign language education, mathematics education, science education, social science education. For further information, write the Department of Curriculum and Instruction.

4100 International Education: Europe and the Americas (3) Historical, philosophical, and sociological foundations; special reference to England, USSR, France, and Germany.

4110 Education in Cultural Perspective (3) Contribution of anthropological concepts (primarily concepts of culture) to understanding of educational processes, problems, and thought in our society and others. (Same as Anthropology 4110.)

4111 Non-Western Education: Anthropological Approaches (3) (Same as Anthropology 4111.)

4150 School Library Administration (3) (Same as Library and Information Science 4150.)

4210 Curriculum in Elementary School Social Studies (3) Analysis of curriculum, approaches and trends in elementary school social studies. Prereq: Teaching experience or student teaching.

4215 Teaching Elementary School Science (3) Methods and materials used in teaching science in elementary school. Developmental and diagnostic/corrective programs. Not open to students with recent course or background in teaching elementary school science.

4216 Teaching Elementary School Mathematics (3) Methods and materials used in teaching mathematics in elementary school. Developmental and diagnostic/corrective programs. Not open to students with recent course or background in teaching elementary school mathematics.

4217 Teaching Elementary School Language Arts (3) Methods and materials used in teaching elementary school language arts. Development of functional relationships with other curriculum areas, diagnostic programs, and corrective work. Not open to students with recent course or background in teaching elementary school language arts.

4240 Classroom Instructional Organization (3) Development of the student's ability to relate group, individualization, space utilization, organization, grading, integration, and achieving an effective classroom; For elementary-classroom teacher. Prereq: Senior standing.

4250 Initiating the Activities Program (3) Prereq: Educational Psychology 2430, 6 hrs of methods of teaching in the elementary school.

4260 Philosophy of Education: Introductory Studies (3) Truth, knowledge, and valuation in the relation to the work of the schools. Prereq: 3010, Educational Psychology 2430 or 3810, or equivalents.

4261 Educational Classics (3) Discussion of selected writings on education from Plato to Dewey.

4280 Diagnosis and Correction of Classroom Reading Problems (3) Prereq: 3200 or equivalent.

4300 Developmental Reading in the Secondary School (3)

4301 Teaching Developmental Reading (3) Methods and materials used in teaching reading in the elementary school. Includes development of functional relationships with other curricular areas, diagnostic procedures and remedial-work. Not open to students with recent course work or background in the teaching of reading.

4302 Reading and Language Development (3) Prereq: 3200 and 3201 or equivalent.

4303 Language Development of Children: Birth-Preadolescence (3) In-depth view of language development from birth through preadolescence; application of process of language development to instructional programs for early and middle childhood.

4340 The Junior High School and Middle School (3) To identify and analyze distinguishing characteristics of the Junior High and Middle School curriculums.

4530-50-70 Problems in Teaching English (3, 3, 3)

4531-51-71 Problems in Teaching Mathematics (3, 3, 3)

4532-62-72 Problems in Teaching Social Studies (3, 3, 3)

4533-63-73 Problems in Teaching Science (3, 3, 3)

4534-64-74 Problems in Teaching Language Arts (3, 3, 3)

4535-65-75 Problems in General Curriculum (3, 3, 3)

4536-66-76 Problems in Instructional Materials (3, 3, 3)

4537-67-77 Problems in Teaching Foreign Languages (3, 3, 3)

4539-69-79 Problems in Teaching Conservation (3, 3, 3)

4381 Problems in Early Childhood Education (3) May be repeated. Maximum 9 hrs. 6 hrs can be taken concurrently.

4400 Problems in Improvement of Instruction (1-3) Special conferences, workshops, or in-service programs designed for improvement of instruction. May be repeated. Maximum 9 hrs. S/NC only.

4410 Educational Sociology (3) (Same as Sociology 4410.)

4450 Teaching in Kindergarten: Overview (3) Relationship of kindergarten to total elementary program; goals; historical settings and current developments.

4451 Teaching in Kindergarten: Program Development (3) Curriculum planning and organization, classroom management. Prereq: Consent of instructor.

4630 Current Educational Problems (3)

4644 Programs, Methods and Materials in Environmental and Science Education (3) Instructional materials, teaching methods, curricular programs and issues in environmental and science education.

4750 Utilization of Instructional Media (3) Introduces the basic communications process, need for instructional media, instructional development, selection and utilization of media, and basic software production techniques. (Same as Library and Information Science 4750 and Vocational-Technical Education 4750.)

4840 Introduction to Data Processing in Education (3) Analysis of current activities in field of educational data processing. Emphasis on curricular, administrative, and research opportunities in education, using modern electronic data processing methods and machines.

4860 Programmed Learning (3) Theories of learning as related to technology of programmed instruction; techniques and applications of programming. Prereq: Psychology 3210, Educational Psychology 3736, or consent of instructor. (Same as Psychology 4680.) 2 hrs and 1 lab.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
5901 Linguistics and the Teacher of English (3) Analysis and application of linguistics in the classroom.

5902 Teaching Composition in the High School (3) Techniques for teaching rhetoric.

5903 Teaching Fiction in the Secondary School (3) Reading, study, and analysis of literary selections.

5904 Teaching the Mass Media in the English Classroom (3) Nature of mass media and importance to American education and life.

5905 Teaching English in the Community/Junior College (3) Emphasis on thorough understanding of communication needs of community/junior college students and objectives, strategies, and materials for meeting these needs.

5906 Teaching Poetry in Grades 7-12 (3) Materials and strategies for teaching poetry.

5907 Teaching Drama in Grades 7-12 (3) Strategies and materials for teaching drama.

5908 Developing Speaking and Listening Skills in Grades 7-12 (3) Strategies and materials for teaching skills of speaking and listening.

5909 Instructional Theory and Design (3) For those individuals who have interest in innovative instructional environments and to sound educational practices in guidance and independent study. Opportunities for individual projects. Prereq: 3650 or 3651-52 or equivalent.

5910 Problems in Lieu of Thesis (3, 3, 3) Some selected philosophical issues in education of concern to classroom instruction. Particular emphasis on interdisciplinary factors on science education.

5911 Directing the Forensic Program (4) (Same as Speech 5911.

5912 Play Production in Secondary Schools (4) (Same as Theatre 5912.

5950 The Function of the Thinking Process in Education (3) Analysis of thinking process for purpose of tracing its implications for educational theory and practice.

5960 The Teaching of Natural Science (3) Teaching strategies, testing and evaluation techniques, and professional guidelines for program planning in science.

5961 Seminar in Science and Environmental Education (3) Recent developments in science education of concern to classroom instruction. Particular emphasis on interdisciplinary factors on science education.

5970 The Teaching of the Social Studies (3) Projects, Programs, and Materials in Social Studies (3) Projects and aids associated with each social science discipline.

6000 Doctoral Research and Dissertation.

6010 Studies in English Education (3) Reading and study in various areas of teaching of English: composition, language, and literature.

6020 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools.

6030 Research and Theory in Teaching Reading (3) Research and theory in application to teacher's reading, research design as it applies to reading investigations. Prereq: Two 5000-level courses in reading.

6031 Seminar in Reading and Language Arts (3) Topics include, but are not limited to, the following: 1) Introduction to reading for teachers, 2) Reading and language processes, 3) Language arts in kindergarten to fourth grade, 4) Language arts in fifth to eighth grade. Prereq: 5000-level course in reading and in language arts.

6040 Seminar in Curriculum and Instruction (1) Required for teachers. S/N only.

6050 Advanced Study of Methodology in the Elementary School (3) Consideration to current and recent literature in field and in educational practices in guiding learning of children. Prereq: 5640 or consent of instructor.

6080 Advanced Seminar in Philosophy of Education (3) Some selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.

6881 Phenomenology and Education (3) Selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.

6882 Philosophical Analysis and Education (3) Philosophical analysis of language and concepts in educational research and writing. Prereq: At least 2 courses in history or philosophy of education.

6910 Education as Social Policy (3) Education as instrument of national or cultural well-being; problems faced by society in shaping educational programs; comparative evaluation of education in this country and in other nations.

6920 Seminar in Elementary School Social Studies Research (3) Current research in elementary social studies, status of research in field, needed research-related research from other fields. Prereq: Graduate course and one graduate course in social studies, or equivalent.

7220 Programs for Curriculum Improvement (3)

739 Seminar in History of Education (3) May be repeated with consent of instructor.

732 Advanced Studies in Elementary School Science (3) Critical analysis of current research in elementary school science. Prereq: Undergraduate course and one graduate course in science, or equivalent.

7350 The Professional Education of Teachers (3) Basic theories, programs, and practices.

7400 The Dynamics of Educational Change (3) Causes of lag between educational theory and practice; factors useful in reducing this lag.

7500 Advanced Studies in Elementary School Language Arts (3) Critical research analysis of selected issues in elementary school language arts. Prereq: 5280 or equivalent and consent of instructor.

7710 Advanced Educational Statistics (3)

7720 Interpretation of Data (3) Types of data in published materials in education; principles of sound interpretation.

7730 Theory and Evaluation in Curriculum Planning (3) Application of principles of evaluation to curriculum programs in elementary and secondary school. Prereq: 5270 or 5410 or equivalent.

7731 Studies in Curriculum Theory and the Structure of Knowledge (3) Some selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education. Prereq: 5270 or 5410 or equivalent.

7740 Curriculum Workshops in Instructional Improvement (3) Observation and participation in workshops sponsored by College of Education; evaluation of workshop approaches to teaching education and instructional improvement.

7850-60-70 Problems in Curriculum and Instruction (3, 3, 3)

8530 Studies in Mathematics Education (3) Reading and study related to historical trends and issues in mathematics education in United States providing broad perspective on current curriculum problems and future trends. Prereq: 5830 or consent of instructor.

8650 Principles of Educational Leadership (3) Conflicting concepts, with application to major problems in instruction, supervision, and administration.

8899 Internship (1-9) Advanced level experiences in application of principles and practices of curriculum development and instructional improvement. Program prerequisites must be met and consent of instructor required. May be repeated. Maximum 12 hrs. S/N only.
## Educational Administration and Supervision

### MAJOR

**DEGREES**

- Educational Administration and Supervision

**M.S., Ed.S., Ed.D.**

**Professors:**

- D. H. Stoller (Head), Ph.D. Ohio State; Emeritus
- C. K. Tennessee, Ph.D. Ohio State; Emeritus
- C. A. Florida; Emeritus
- G. O. Florida, Ed.D.

**Adjunct Professors:**

- L. K. O'Fallon, Ed.D.
- G. C. Ubben, Ph.D.
- P. M. Trusty Ed.D. Stanford; Emeritus

**External Consultants:**

- H. F. Aldmon, Ed.D. Tennessee; Emeritus
- G. W. Harris, Jr., Ph.D. Michigan; Emeritus
- P. M. Husen, Ed.D. Stanford; Emeritus
- J. T. Lovell, Ed.D.
- E. W. Michigan; Emeritus
- C. K. Tanner, Ed.D. Florida State; Emeritus
- R. K. Roney, Ed.D. Florida; Emeritus
- O. K. O'Fallon, Ed.D. Colorado; Emeritus
- C. M. Achilles, Ed.D. Rochester; Emeritus
- C. M. Peccolo, Ph.D. Iowa; Emeritus
- C. M. Tennessee; Emeritus
- G. C. Ubben, Ph.D. Michigan; Emeritus

**Associate Professors:**

- H. F. Aldmon, Ed.D. Tennessee; Emeritus
- G. W. Harris, Jr., Ph.D. Michigan; Emeritus
- P. M. Husen, Ed.D. Stanford; Emeritus

**Programs**

Programs are planned for (1) students preparing for administrative positions normally found in the educational structure of the state; (2) students preparing for the positions of supervisors of education; (3) administrators and supervisors in service who wish to improve their professional competence; (4) students and teachers preparing for teaching positions involving administrative responsibilities; and (5) students preparing for teaching educational administration or for administrative positions in higher education. In addition to M.S. and Ed.D. degrees, a special two-year graduate program is offered which leads to the Ed.S. (supervisory degree) and which provides advanced preparation for applicants judged to be potentially competent school administrators.

**5000 Thesis**

5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5100 Internship in Educational Administration (3) May be repeated with consent of department. Maximum 6 hrs.

5100 Introduction to Educational Administration (3)

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3)

5220 Philosophy and Theory in Educational Administra- tion (3)

5220 Seminar in the Behavioral Sciences for Educational Administra- tion (3)

5220 The Politics of Education (3) Special emphasis on leadership structures, operational beliefs, and communication of ideas with regard to community decisions concerning education.

5310 School Administration in a Multiethnic Society (3) Opportunity to identify and explore educational problems arising from ethnic and racial diversity, tensions, and hostilities with which school administrators must deal within individual school or on district-wide basis.

5420 District Level Administration (3)

5430 Building Level Administration (3) For beginning school principals and administrators, and for those operating in rural elementary, secondary, or consolidated schools.

5440 Introduction to Law, Finance, and Business Management at the Building Level (3)

5450 Organization of the School Program (3)

5470 Introduction to School Facility Planning (3)

5480 Introduction to Supervision and Personnel Administration (3) Principles, methods, and techniques of leadership.

5490 Administration of Community Education (3) Administrative factors of primary importance in development of community education programs in the public schools.

5500 Analysis and Interpretation of Research for Educational Administrators (3)

5700 Seminar in Communication Skills for Educational Administrators (3)

5711-21-31 Problems in Educational Administration and Supervision: School Operation (3, 3, 3)

5712-22-32 Problems in Educational Administration and Supervision: Higher Education (3, 3, 3)

5713-23-33 Problems in Educational Administration and Supervision: State School Administration (3, 3, 3)

5714-24-34 Problems in Educational Administration and Supervision: Preparation Programs (3, 3, 3)


5720 Seminar in Urban School Administration (3) Studying and analyzing administration in urban school districts.

5730 School Business Management (3)

5740 School Law (3) Constitutional provisions, special legal interpretation of Tennessee law affecting educational administration.

5751-61-71 Problems in Educational Administration and Supervision: Theory (3, 3, 3)

5752-62-72 Problems in Educational Administration and Supervision: Finance (3, 3, 3)

5753-63-73 Problems in Educational Administration and Supervision: Transportation (3, 3, 3)

5754-64-74 Problems in Educational Administration and Supervision: Business Management (3, 3, 3)

5755-65-75 Problems in Educational Administration and Supervision: Personnel (3, 3, 3)

5756-66-76 Problems in Educational Administration and Supervision: Supervision (3, 3, 3)

5757-67-77 Problems in Educational Administration and Supervision: Organization and Structure (3, 3, 3)

5758-68-78 Problems in Educational Administration and Supervision: School Law (3, 3, 3)

5759-69-79 Problems in Educational Administration and Supervision: Supervision (3, 3, 3)

5770 Maintenance of School Plants (3)

5780 Supervision (3) Supervisory activities of county and city school supervisors. Use of committees, effective techniques for working with groups, relationships with local and state administration, and personnel, and techniques for evaluation of supervisory programs.

5790 School Board-Superintendent Relationships (3)

5810 Survey Research Methods (3) Overview of descriptive statistics, data collection, analysis and interpretation for survey studies and school surveys, strategies for descriptive research in education.

5880 Contemporary Economics and Educational Finance (3)

5900 Decision Making and Decision Theory in Educational Organizations (3) Theoretical constructs underlying executive decision making; direct application of decision theory problem-solving activities, and practicing administrator. Executive decision making at several administrative levels in complex educational organization. S/NC only.

5910-20-30 Problems in Lieu of Thesis (3, 3, 3)

5980 Administration in Higher Education (3)

5981 Specialized Seminar: School Operation (3)

5982 Specialized Seminar: Higher Education (3)

5983 Specialized Seminar: State School Administration (3)

5984 Specialized Seminar: Preparation Programs (3)

5991 Specialized Seminar: Theory (3)

5992 Specialized Seminar: Finance (3)

5994 Specialized Seminar: Business Management (3)

5995 Specialized Seminar: Personnel (3)

5998 Specialized Seminar: School Law (3)

6000 Doctoral Research and Dissertation

6040 Seminar in Educational Administration and Supervision (1) Required three consecutive quarters. S/NC only.

6100 Internship in Educational Administration (3) May be repeated at discretion of student's committee. Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative.

6210 Modern Trends in the Theory and Practice of Educational Administration and Supervision (3)

6220 Programs for the Professional Preparation of Educational Administrators and Supervisors (3)

6460 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective bargaining in education, and staff evaluation.

6480 Special Topics in School Personnel Administra- tion (3) Human problems in school personnel administration; staff planning, record systems, personnel policy development; collective bargaining in education, and staff evaluation. May be repeated. Maximum 12 hrs.

6530 Futuristic Educational Planning Methods (3) Methods for describing alternative futures.

6550 State-Federal Relations in Education (3)

6560 Legal Foundations of Public Education (3)

6580 Seminar in Managing Conflict (3) Learning about and experiencing various forms of conflict.

6750-70-70 Independent Studies in Educational Administration and Supervision (3, 3, 3) Prereq: Consent of instructor.

6800 Administration of Complex Educational Orga- nizations (3)

6870 Advanced Study in School Facility Planning (3)

6990 Specialized Doctoral Seminar in Politics of Education (3) Political theories and practices as they affect operations of public school system. Appropriate interdisciplinary discussions based on literature and research from education, sociology, and political science. One field inquiry.
Educational Psychology and Guidance

**MAJORS**

- **DEGREES**
  - Guidance
  - College Student Personnel
  - Educational Psychology
  - Educational Psychology and Guidance

**Professors:**

- L. M. Reddick (Head), Ph.D., Michigan
- S. C. Dietz, Ed. D., Arizona State; S. W. Huck, Ph.D., Texas
- W. A. Poppen, Ph.D., Ohio State; E. W. Schoch, Ed. D.
- M. Kindall, Ed.D., Florida; Ph.D., Ohio State; R. L. Williams, Ph.D., George Peabody.

**Associate Professors:**

- K. L. Davis, Ed.D., Georgia; D. J. Dickinson, Ed. D.
- Ohio State; M. R. K. Epperson, Ph.D., Texas
- Ed.D.Tennessee; M. A. Hector, Ph.D., Michigan State; S. B. Loud, Ph.D., Indiana; K. R. Swander, Ph.D., Florida.

**Assistant Professors:**

- G. D. Ciegler, Ed.D., Tennessee; T. W. George, Ed.D.

**Graduate programs (thesis or non-thesis option)**

- **Thesis**
  - DEGREES
  - M.S.
  - M.S.
  - M.S.

- **Non-Thesis Graduation Completion (3-15)**

- **Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.**

- **5040 Guidance and Pupil Personnel Services in Education (3)**

- **5050 Children and Adolescents (3)**

- **5060 Group Approaches with Students (3)**

- **5099 Field Work (1-6)**

- **5100 Developmental Psychology (3)**

- **5110 Psychology of Women (3)**

- **5200 Seminar in Elementary School Guidance (3)**

- **5210 Seminar in Bias-Free Counseling (3)**

- **5454-55-56 Student Leadership Workshops (1, 1, 1)**

- **General Evaluation Procedures for Public Schools (3)**

- **4440**
6910 Special Topics Seminar (3) Exploration of specific research or theoretical topics with students who have necessary background. Topic will vary from quarter to quarter, depending upon instructor. Prereq: Consent of department. May be repeated. S/NC only.

6941-42-43 Practicum in Guidance, Counseling, and Personnel Services (3, 3, 3) Supervised practice in application of guidance tools and techniques. Minimum: 90 clock hours each quarter. Prereq: 5690 and consent of instructor.

6945-46 Teaching Practicum in Educational Psychology and Guidance (3, 3, 3) Prereq: Acceptance in doctoral program and consent of instructor.

6950 Counseling Supervision (3) May be repeated with consent of advisor. Prereq: 5690, 5940, 6810, 6841. S/NC only.

Special Education and Rehabilitation

MAJORS
Special Education

DEGREES
M.S.

Vocational Rehabilitation Counseling

M.S.

Professors:

Associate Professors:

Assistant Professors:

Instructors:

Lecturers:
R. D. Amsden, M.S. Tennessee; Z. H. Brody, M.A. Tennessee; H. L. Byrd, Jr., M.S. Tennessee; O. E. Fleece, B.S. Memphis State.

An experience program for regular teachers, special teachers, and rehabilitation personnel may be planned to meet the needs of exceptional children and adults in relationship to the program of general education. Specialized courses may be distributed over the several areas of exceptionality with emphasis in an area of special interest or need. Facilities are available for continuous observation and participation in direct relationships with handicapped children and adults who are hospitalized, homebound, or in residential schools, special classes, or regular classes.

Course sequences may be planned in specialized areas to include (1) hearing impaired; (2) gifted; (3) learning disabilities; (4) mentally retarded; (5) multiple disabilities; (6) socially or emotionally maladjusted; (7) rehabilitation counselor education; (8) disability evaluation methods.

Programs lead to the Master of Science degree in Special Education with an emphasis in one of the specialized areas. Among the areas of specialization available is disability evaluation (non-thesis only).

Under the sponsorship of Social and Rehabilitation Services, a specialized institute for the preparation of professionals to adapt their skills toward services to hearing impaired and deaf people is provided.

For further information write the department head.

EDUCATION OF THE HEARING IMPAIRED

4000 Rehabilitation Practicum (3) Evaluation of client data practicing rehabilitation prognosis. Prereq: 4230.

4190 Speech Development of Hearing Impaired (3) Anatomy and physiology of speech and sound systems. Relationship of hearing to speech development. Prerequisites and techniques of speech development and improvement with hearing impaired children. Prereq: 4190, consent of instructor. (Same as Audiology and Speech Pathology 4190.)

4200 Practicum in Speech Development of Hearing Impaired I (3) Observation of normal communication. Observations and practice. (Same as Audiology and Speech Pathology 4200.)

4210 Language Development of Hearing Impaired (3) Theory and practice of language development. Prereq: 4220 or consent of instructor. (Same as Audiology and Speech Pathology 4210.)

4230 Communication Processes for the Hearing Impaired I (3) Various communicative skills required by hearing impaired persons. Speech and language development, auditory training, speech reading, manual language and its relation to other forms of communication. Observations and practice. (Student must acquire a degree of proficiency in use of manual language.) Prereq: Consent of instructor.

4231 Communication Processes for Hearing Impaired II (3) Intermediate course in manual communications skills and techniques with emphasis on expressive fluency. Prereq: 4220 or consent of instructor.

4240 Nature of Hearing Impairments (3) Basic principles of audiology: anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; audiograms; selection and use of hearing aids; relation of audiologic services to medical and other rehabilitative disciplines. Observations and practice.

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) For those planning to enter field of teaching deaf and hard-of-hearing. Review of history of education of deaf. Research studies relating to psychology, social adjustment, and learning of deaf. Survey of professional literature in area of deaf child and adult. (Same as Audiology and Speech Pathology 4250.)

4260 Curriculum Development in Elementary and Secondary Schools for Hearing Impaired (3) Adapting curriculum development and teaching methods in public school education to meet needs of deaf and hard-of-hearing students in residential and integrated settings.

4290 The Teaching of Reading to Hearing Impaired Children (3) Readiness activities, developmental approaches, theories, and specialized materials for curriculum and teaching reading.

4270 Student Teaching with Hearing Impaired Children (3) Supervised practice with pre-school, day school, and residential pupils. S/NC only.

4271 Practicum with Hearing Impaired Children (3) S/NC only.
5120 Psychosocial Aspects of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implications of family and community.

5121 Job Development and Placement in Rehabilitation (3) Strategies and techniques for matching handicapped persons; utilization of occupational resource materials and techniques including field experiences for assisting jobs, procedures necessary for helping a handicapped individual successfully adjust to a work force; assessment of future trends within labor market.

5130 Seminar in Rehabilitation (3, 3)

5141 Diagnostic Vocational Evaluation in Rehabilitation (3) Process, principles, and techniques used to diagnose vocational assets and liabilities of the handicapped person; emphasis on careful analysis of biographical data and use of evaluation interview.

5142 Prognostic Vocational Evaluation in Rehabilitation (3) Process, principles, and techniques used to determine and predict work behavior and vocational potential. Includes rationale underlying selection and use of relevant academic, vocation exploration programs, work samples, situational tasks, simulated work experiences, and job tryouts in vocational evaluation. Prereq: 5141.

5143 Interpretive Vocational Evaluation Data in Rehabilitation (3) Procedures, principles, and techniques used in interpretation of vocational evaluation data to handicapped adults, to referral agency, and to facility staff. Interrelation of data through the formal staff conference, vocational ranking report writing, and follow-up. Prereq: 5141 and 5142.

5144 Development and Supervision of Client Evaluation Programs (3) Procedures involved in establishment and maintenance of effective vocational education program; emphasis on planning amount of floor space, type of equipment, type and number of staff, and lines of communication essential to meeting needs of evaluation programs. Effective supervisory, referral, recordkeeping, and staff development practices. Prereq: 5141, 5142 and 5143, or consent of instructor.

5154-46 Practicum in Rehabilitation (3, 3) Supervised experience in area of rehabilitation work; emphasis on applications of relevant academic principles, and skills acquired in previous or concurrent course work. Prereq: Consent of instructor.

5150-60 Internship in Rehabilitation (9, 9)

5170 Systematic Human Relations Training (3) Active listening, observing verbal and nonverbal behavior, and insight into developing and communicative handicapped individuals.

5180 Approaches to Rehabilitation Counseling (3) Approaches and techniques in individual and group counseling with handicapped adults to further develop student’s counseling skills. Problem-solving techniques and utilization of alternative modes of counseling procedures in rehabilitation. Prereq: 5170 or consent of instructor.

5185 Evaluation and Mobilization of Community Resources (3) Issues, processes, and programs relating to community resources and services with emphasis on coordination and mobilization of community resources and services to handicapped individuals.

5190 Orientation to Rehabilitation (3) History, philosophy, goals, and principles of rehabilitation movement; case finding, intake, diagnosis, physical restoration, counseling, training, placement, follow-up: relationship of rehabilitation agencies, rehabilitation teams; facilities and programs in hospitals, institutions, community agencies, and service groups. Attention to specialization in disability categories such as mentally ill, mentally retarded, and blind.

5195 Caseload Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in state rehabilitation agencies and public/private rehabilitation facilities; appropriate use of institutional models related to rehabilitation programs; and simulated experience in work planning, decision making, and case management.

5210 Psychosocial Aspects of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implications of family and community.

5211 Social Psychology of Disability (3) Basic concepts and psychological implications of disability; focus on social and interpersonal relationships of disabled individuals.

5212 Disability in Society (3) Effects of society on disabled individuals; conceptions of disability; the self-concept of the handicapped individual; role of the handicapped individual in society.

5215 Job Development and Placement in Rehabilitation (3) Strategies and techniques for matching handicapped persons; utilization of occupational resource materials and techniques including field experiences for assisting jobs, procedures necessary for helping a handicapped individual successfully adjust to a work force; assessment of future trends within labor market.

5216 Seminar in Rehabilitation (3, 3)

5220 Psychiatric Aspects of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implications of family and community.

5223 Rehabilitation in the Workplace (3) History, philosophy, goals, and principles of rehabilitation movement; case finding, intake, diagnosis, physical restoration, counseling, training, placement, follow-up: relationship of rehabilitation agencies, rehabilitation teams; facilities and programs in hospitals, institutions, community agencies, and service groups. Attention to specialization in disability categories such as mentally ill, mentally retarded, and blind.

5224 Caseload Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in state rehabilitation agencies and public/private rehabilitation facilities; appropriate use of institutional models related to rehabilitation programs; and simulated experience in work planning, decision making, and case management.

5225 Psychosocial Aspects of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implications of family and community.

5226 Job Development and Placement in Rehabilitation (3) Strategies and techniques for matching handicapped persons; utilization of occupational resource materials and techniques including field experiences for assisting jobs, procedures necessary for helping a handicapped individual successfully adjust to a work force; assessment of future trends within labor market.

5227 Seminar in Rehabilitation (3, 3)

5228 Community Psychology of Disability (3) Basic concepts and psychological implications of disability; focus on social and interpersonal relationships of disabled individuals.

5229 Disability in Society (3) Effects of society on disabled individuals; conceptions of disability; the self-concept of the handicapped individual; role of the handicapped individual in society.

5230 Social Psychology of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implications of family and community.

5231 Psychiatric Aspects of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implications of family and community.

5232 Rehabilitation in the Workplace (3) History, philosophy, goals, and principles of rehabilitation movement; case finding, intake, diagnosis, physical restoration, counseling, training, placement, follow-up: relationship of rehabilitation agencies, rehabilitation teams; facilities and programs in hospitals, institutions, community agencies, and service groups. Attention to specialization in disability categories such as mentally ill, mentally retarded, and blind.

5233 Caseload Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in state rehabilitation agencies and public/private rehabilitation facilities; appropriate use of institutional models related to rehabilitation programs; and simulated experience in work planning, decision making, and case management.

5235 Psychosocial Aspects of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implications of family and community.

5236 Job Development and Placement in Rehabilitation (3) Strategies and techniques for matching handicapped persons; utilization of occupational resource materials and techniques including field experiences for assisting jobs, procedures necessary for helping a handicapped individual successfully adjust to a work force; assessment of future trends within labor market.
4560 Education of Partially Sighted Children (3)
Curricular adjustments and materials; home visits for parents’ cooperation in medical care and special needs.

4650 Eye Problems Encountered by the Teacher (3)
Eye anatomy and hygiene; common diseases and defects; testing and treatment; educational adjustments for specific eye conditions; related service resources.

4923 Student Teaching of the Partially Seeing (3)
Observation and supervised practicum in special and regular classes. S/NC only.

GENERAL COURSES

3333 Education of the Exceptional Child (3)
Principles, characteristics, local and state programs for diagnosis and care; curricular adjustments; directed study of special needs; service resources.

3520 Language-Speech Handicapped Child in the Classroom (3)
Recognizing and understanding speech problems; observing normal and defective speech development; incorporation of speech improvement activities into the curriculum. For students not majoring in speech and hearing.

4550-60-70 Problems in the Education of Exceptional Children (3, 3, 3)
Prereq: Consent of instructor.

4740 Diagnostic and Remedial Approaches in Special Education and Rehabilitation (3)
Critical analysis and evaluation of diagnostic and remedial procedures employed in measurement of educational needs of children and adults who are mentally retarded, learning disabled, multiple handicapped or physically handicapped.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-16)
Required for the non-thesis student not otherwise registered during any quarter when such a student has met the minimum face-time degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5260 Education of Gifted Children (3)
Curricular and social adjustments.

5400 Assessment and Remediation of Learning Disabilities (3)
Identification and remediation of learning problems of children: neurological and medical aspects; task analysis of cognitive, affective, and psychomotor skills; formal diagnostic testing material emphasizing cognitive development. Optimizing teaching instruction combined with a prescriptive teaching approach to learning disabilities.

5401 Prescriptive Teaching for Children with Learning Disabilities (3)
Diagnostic test materials to assess functional levels of ability followed by specific remedial recommendation concerning individual student’s best instructional strategies. Emphasis on reading and mathematics skill development. Materials designed for ethnic population, high interest level, auditory, assessing sensory, linguistic and motor development.

5402 The Exceptional Child in the Regular Classroom (3)
Adoption, modification, delivery, and maintenance of instructional activities for exceptional child within regular classroom. Learning and academic considerations stressed. Prereq: 5401 or consent of instructor.

5403 Resource Teachers for the Handicapped (3)
To help students acquire the skill to maintain mildly handicapped children in regular public school environments; job descriptions and expectations, interpersonal relations, assessment of abilities, modifications of curriculum content, and applied teaching methodology.

5410 Instructional Media for the Handicapped: Design, Production, and Evaluation of Prototypical Curriculum Materials (9) Perception, communication, and learning theories; media design and advanced production techniques; evaluation procedures. Emphasis on planning and producing prototype media materials specifically designed to meet needs of handicapped learners. Enrollment limited to persons holding major responsibility for evaluation or implementation of program for handicapped or similar setting. Prereq: 4410 or equivalent. (For Summer Media Institute only.)

5450-60-70 Experience in Teaching and Supervision of Exceptional Children (1-6, 1-6, 1-6)

5510-20-30 Administrative Practicum on Problems in Institutional Care of Children (3, 3, 3)
Physical and social development; business and personnel management. Prereq: Training and experience in institutions for children, or consent of instructor.

5550-60-70 Problems in the Education of Exceptional Children (3, 3, 3)

5620 Counseling Parents of Exceptional Children (3)
Interpreting exceptionalities (handicapped and gifted) to parents and others; understanding and acceptance of the child in school/home.

5630 Psychology of the Exceptional Child (3)

5790 Career Development: Workshop (1-6) (Same as Educational Psychology 5790.)

5830 Seminar: Issues and Theories in the Education of the Exceptional Child (3)
Current trends in education of exceptional child, application of philosophical approaches to education; analysis of current theories of integration as applied to exceptional child. Current research concerning education and/or rehabilitation of exceptional person. Prereq: Admission and Instruction 5800 or Educational Psychology 5210 and consent of instructor.

5910-20-30 Problems in Lieu of Thesis (3, 3, 3)

5970 Juvenile Delinquency and the School (3)
Responsibilities of school in studying sources of maladjustment: school function in community programs for children's welfare; curricular adjustments; directed study of socially maladjusted children, environment, and programs for meeting needs.

Vocational-Technical Education

MAJORS

Agricultural Education
Business Education
Home Economics Education
Industrial Education
Veterinary-Technical Education

DEGREES

M.S.
M.S., MACT
M.S.
M.S.
M.S., Ed.S., Ed.D.

Professors:
R. W. Haskell (Emeritus), Ph.D. Ohio State.


Industrial Education: J. W. Brown, (Chairperson), Ph.D. Wisconsin.

Associate Professors:


Economics Education: J. H. McIntyre, Ph.D. Florida State; S. W. Miller, Ph.D. Ohio State; H. Stark (Emeritus), M.B. Colorado State.

Industrial Education: J. Bries, Ph.D. Missouri; D. C. Cokesley, Ed.D. Chicago; D. P. H. Kansas State; H. Hanson, Ph.D. Purdue.

Assistant Professors:
R. A. Smith, M.Ed. (Chairperson), Ed.D. Michigan.

Chairperson:
R. W. Haskell, Ph.D. Purdue;
J. L. Reed (Chairperson), M.S. Oklahoma.

College of Education

Assistant Professors:


Economics Education: J. H. McIntyre, Ph.D. Florida State; S. W. Miller, Ph.D. Ohio State; H. Stark (Emeritus), M.B. Colorado State.

Industrial Education: J. Bries, Ph.D. Missouri; D. C. Cokesley, Ed.D. Chicago; D. P. H. Kansas State; H. Hanson, Ph.D. Purdue.

Assistant Professors:
R. A. Smith, M.Ed. (Chairperson), Ed.D. Michigan.

Chairperson:
R. W. Haskell, Ph.D. Purdue;
J. L. Reed (Chairperson), M.S. Oklahoma.
THE MASTER’S PROGRAM

Each vocational service area (agricultural education, business education, distributive education, home economics education, industrial education and vocational-technical education) offers similar programs leading to the Master’s degree. Both thesis and non-thesis options are available. Details regarding the Master’s programs of each of the service areas may be obtained from the chairpersons of the different services. The MACT is also available in the business education area.

THE SPECIALIST PROGRAM

The Ed.S. degree program, which is a thesis or non-thesis program, is a cooperative undertaking involving all vocational service areas. Options are available in agricultural, business, distributive, and industrial education and in general vocational-technical education.

THE DOCTORAL PROGRAM

The comprehensive Ed.D. program in Vocational-Technical Education is designed to provide for achieving professional objectives, developing needed competencies, and gaining desirable experiences and understanding of vocational-technical areas.

The Vocational-Technical Education doctoral curriculum consists of the following: professional education core, 15 hours; service area, 18 hours; vocational-technical education, 18-27 hours; cognate fields, 9-18 hours; research techniques, 6-12 hours; and dissertation, 36 hours. A minimum of 120 hours above the baccalaureate is required.

4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Library and Information Science 4750.)

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time. Bachelor’s degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5010 History and Organization of Vocational-Technical Education (3) Vocational and technical education in public schools through analysis of social forces, legislation, and organizational models.

5011-21-31 Problems in Lieu of Thesis (3, 3, 3)

5020 Competency Based Vocational Education (3) Introductory, comparative, and practical approaches to competency-based curricula and materials in vocational and technical education.

5040 Guidance and Pupil Personnel Services in Education (3) (Same as Educational Psychology 5040.)

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) Selection, analysis, and completion of a problem necessitating original investigation, beneficial to investigator and vocational-technical field.


5260 Continuing Education in Vocational-Technical Education (3) Introduction, objectives, historical development, psychological and sociological formulations, methods and techniques, research, and evaluation.

5270 Placement, Follow-up and Evaluation Procedures in Occupational Education (3) Methods and procedures in establishing placement programs; course planning, evaluation, and program revision in occupational education.

5300 Occupational Program Development for Disadvantaged Persons (3) Problems of the academic, socioeconomic, cultural and/or other handicaps that prevent individuals from succeeding in regular vocational education programs.

5310 Supervision of Vocational-Technical Education (3) Supervision of program planning, coordination, and instruction. Roles and functions of supervisors.

5560-60-70 Problems in Vocational-Technical Education (1-6) (1-6, 1-6) May be repeated. Maximum 9 hrs.

6000 Doctoral Research and Dissertation

6040 Seminar in Vocational-Technical Education (1, 1, 1) Required 3 consecutive quarters during residency. S/NC only.

6210 Curriculum Planning in Vocational-Technical Education (3) Prereq: Curriculum and Instruction 5410 or equivalent.

6220 Program Planning and Development in Vocational-Technical Education (3) Planning vocational-technical and manpower state, local, and institutional programs; research in planning, advisory committees, planned change, administrative structures, and evaluation procedures.

6230 Evaluation of Vocational-Technical Education Programs (3)

6310 Administration of Vocational-Technical Education (3) Administrative principles and relationships to vocational and technical training.

6411-12-13 Internship in Vocational and Technical Education (3, 3, 3) Field experiences in selected areas of vocational and technical education. S/NC only.

Agricultural Education

4510-20-30 Problems in Agribusiness Education (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.

4710-20-30 Seminar in Agricultural Education (1, 1, 1) Prereq: 4530 or consent of department head.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time. Bachelor’s degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5011 Graduate Seminar in Current Problems (3)

5111-12-13 Graduate Seminar: Current Problems in Business Education (1, 1, 1)

5120 Graduate Seminar in Tests and Measurement (3)

5130 Graduate Seminar in Guidance (3)

5140 Organization and Operation of Area Vocational-Technical Schools (3) (Same as Industrial Education 5140.)

5410-20-30 Practicum in Business Education (2, 2, 2)

5510 Evaluation of Research in Business Education (3) Prereq: Curriculum and Instruction 5610 or equivalent.

5511-21-33 Problems in Business Education: Typing (3, 3, 3)

5612-25-32 Problems in Business Education: Shorthand (3, 3, 3)

5623-33 Problems in Business Education: Bookkeeping and Accounting (3, 3)

5614 Methods and Materials for Vocational Office Education (3) Methods and materials for vocational office education programs. Development of instructional aids, recent developments and research, individualized instruction, and occupational clusters for VOE.

5624 Problems in Business Education: Clerical Practice (3)

5615-25-35 Problems in Business Education: General Business (3, 3, 3)

5618 Organization and Management of Vocational Office Education Program (3) Developing occupational programs, guidelines in cooperatives, laboratory and model office projects, physical facilities, instructional aids, related instructional activities (clubs), enrollee, instructor and advisory committee.

5628 Problems in Business Education: Administration (3)

6110-20-30 Current Issues in Business Education (3, 3, 3)

6210-20-30 Advanced Studies in Business Education (3, 3, 3)

6410 Higher Education for Business (3)

Business Education

4230 Curriculum Construction in Business Education (3) Aims, principles, practices and problems in construction of business curricula for various types of educational institutions in which business subjects are taught.

4610-20-30 Problems in Business Education (3, 3, 3)

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5011 Problems in Lieu of Thesis (3)

5110 Graduate Seminar in Current Problems (3)

5111-12-13 Graduate Seminar: Current Problems in Business Education (1, 1, 1)

5120 Graduate Seminar in Tests and Measurement (3)

5130 Graduate Seminar in Guidance (3)

5140 Organization and Operation of Area Vocational-Technical Schools (3) (Same as Industrial Education 5140.)

5410-20-30 Practicum in Business Education (2, 2, 2)

5510 Evaluation of Research in Business Education (3) Prereq: Curriculum and Instruction 5610 or equivalent.

5511-21-33 Problems in Business Education: Typing (3, 3, 3)

5612-25-32 Problems in Business Education: Shorthand (3, 3, 3)

5623-33 Problems in Business Education: Bookkeeping and Accounting (3, 3)

5614 Methods and Materials for Vocational Office Education (3) Methods and materials for vocational office education programs. Development of instructional aids, recent developments and research, individualized instruction, and occupational clusters for VOE.

5624 Problems in Business Education: Clerical Practice (3)

5615-25-35 Problems in Business Education: General Business (3, 3, 3)

5618 Organization and Management of Vocational Office Education Program (3) Developing occupational programs, guidelines in cooperatives, laboratory and model office projects, physical facilities, instructional aids, related instructional activities (clubs), enrollee, instructor and advisory committee.

5628 Problems in Business Education: Administration (3)

6110-20-30 Current Issues in Business Education (3, 3, 3)

6210-20-30 Advanced Studies in Business Education (3, 3, 3)

6410 Higher Education for Business (3)

Distributive Education

4130 Areas of Distribution (3) Marketing, product or service technology, social skills, basic skills, and distribution as these areas affect the distributive education curriculum in secondary and postsecondary programs.

4140 Supervised Distribution Experience (3) Minimum 200 hours experience in approved distributive business; concurrent analytic project.
program in secondary school—day-school, adults, home experience, and Future Homemakers of America.

5610 Supervision of Home Economics in the Public Schools (3) For teachers with successful experience in vocational home economics preparing for supervisory positions in vocational education. Prereq: 4110. May be repeated. Maximum 3 hrs. per course.

5610-20-30 Special Problems for Non-Thesis Students (3, 3, 3)

5610-20-30 Problems in Home Economics Education (1-3, 1-3, 1-3) May be repeated. Maximum 3 hrs. per course.

5610-20-30 Seminar in Home Economics Education (3, 3) Research literature and techniques. Prereq: Consent of instructor.

Industrial Education

3110 History and Philosophy of Industrial Education (3)

210-20-30 Part-Time Programs in Co-operative Industrial Training (3, 3, 3) Principles of organization, methods, and materials.

3120 Shop Organization and Management (3)

3230-30 Materials and Methods for Teachers of Shop and Related Subjects (3, 3)

3400 School Shop Safety (3)

3610 Development and Utilization of Advisory Committees and other groups. Prereq or coreq: 3400.

4100 Foremanship Training by the Conference Method (3)

4120-30 Job Analysis (3, 3) Principles, practice, instructional methods.

4120-30 Job Analysis (3) Principles of evaluation in development of home economics programs; techniques used in evaluation. Techniques for determining progress of students; individual problems of evaluation. Prereq: 3110. May be repeated. Consent of instructor.

5110 Advanced Methods of Teaching Homemaking Classes for Adults (3)

5130 Furthering Good Human Relationships in the Classroom (3) Relationships between problems in human relations, basic needs of individuals, techniques of interpersonal relations and social values in developing more effective teacher education programs.

5220 Evaluation in Home Economics Education (3, 3, 3) Individual research, conferences, and workshops in teaching and supervising high school, postsecondary, and adult programs.

5616-26-33 Problems in Distributive Education: Retailing (3, 3, 3)

Home Economics Education

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5110 Administration and Supervision of Distributive Education (3) Operation of a distributive education program of a city or county supervisor. Understanding and appreciating problems from school principal’s and department head’s point of view. Trends in distributive education; community surveys, state plans, teacher-coordinator qualifications, changing curriculum.

5120 Organizing and Teaching Adult Distributive Education (3, 3, 3) Planning, organizing, promoting, teaching, and evaluating continuing education programs in distributive education, utilizing trade associations, employment agencies, business groups, and advisory committees in implementation.

5210-20-30 Special Problems in Distributive Education (3, 3, 3) Individual research, conferences, and workshops in teaching and supervising high school, postsecondary, and adult programs.

5616-26-33 Problems in Distributive Education: Retailing (3, 3, 3)

School of Health, Physical Education, and Recreation

Madge M. Phillips, Director

Graduate programs are available to students preparing for (1) teaching and research positions in colleges, high schools and elementary schools; (2) administrative and supervisory work in athletics, health education, physical education, and recreation; (3) recreation specialist positions in various public, voluntary, private, and commercial agencies and institutions; and (4) public health positions in community health education, health planning and administration, and environmental health.

The Master’s Program

Four programs leading to the Master of Science degree are available: Physical Education, Recreation, Safety Education and Service, and School Health Education. Forty-five quarter hours are required for the M.S. Approximately 23 quarter hours of work selected from courses numbered 5000 and above are included in the M.S. requirement. Course selection shall be
made according to each student's professional interests in health, physical education, safety, or recreation with the approval of the major professor. Non-thesis options are available in all M.S. degree programs. A 3 quarter-hour course in research techniques and/or statistics and/or a seminar in research will be required. Each non-thesis degree candidate will take a final comprehensive examination.

Programs leading to the Master of Public Health are also available in community health education, health planning/administration, and occupational/environmental health and safety. Fifty-four quarter hours are required for the M.P.H. degree. One full quarter of field practice is required. During field practice, no student shall hold a full-time job except by special permission of the division chairperson. Students may be placed in all parts of this country.

**DOCTORAL PROGRAMS**

The Doctor of Education and the Doctor of Philosophy degrees are offered in Health Education. See further description under Health Education.

The Doctor of Education degree is offered with a major in Physical Education and two collateral areas of study. The curriculum to be pursued will be determined by the student and a doctoral committee. Selection of this curriculum will be based on the past training, experience, and interest of the student.

The basic requirements for admission are:

1. A minimum of 40 (physical education) or 50 (health education) quarter hours.
2. Submission of satisfactory scores on the aptitude section of the Graduate Record Examination is required for all doctoral and specialist programs.
3. A superior grade point average.
4. Submission of satisfactory references relating to training, employment, and character.

Evidence of successful teaching or potential for success in the major area of study.

**Graduate Assistantships.** A variety of graduate assistantships are offered in health education, physical education, safety education, and recreation to qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the Master's and doctoral programs.

Assistantships are made available by local schools, agencies, and the School of Health, Physical Education, and Recreation in return for part-time services rendered. The services may consist of teaching physical education classes, teaching health classes, teaching safety classes, leading recreational activities, supervising recreation class work, students, and/or directing or helping to manage extracurricular programs.

Students interested in these opportunities should file their applications before February 1. Letters should be addressed to: The School of Health, Physical Education, and Recreation, The University of Tennessee, Knoxville, Tennessee 37916.

**Public Health Traineeships.** A few Public Health Traineeships are offered for Master of Public Health candidates concentrating in community health education. These are provided by the United Public Health Service. Letters should be addressed to: Health and Safety Division, The University of Tennessee, 1914 Andy Holt Avenue, Knoxville, Tennessee 37916.

**Departments of Instruction**

**Division of Health and Safety**

**MAJORS**

- Health Education
- Public Health
- Safety Education and Service
- School Health Education

**DEGREES**

- Ed.D.: Health Education
- M.P.H.: Public Health
- M.S. Ed.: Safety Education and Service
- M.S.: School Health Education

**Professors**

- R. H. Kyrk (Chairperson), H.S.D. Indiana;
- W. J. Huffman, Ed.D. Illinois;

**Associate Professors**

- I. A. Ahmad, Ph.D. Oregon;
- C. B. Hamilton, Dr. P.H. Oklahoma;
- G. Gorse, Dr. P.H. California (Los Angeles);
- A. M. Milliken (Emeritus), M.A. Yale.

**Assistant Professor**

- A. F. Thompson, Ph.D. Michigan State.

**Lecturers**

- M. Duffey, M.D. Pennsylvania;
- H. P. Hopkins, Ph.D. North Carolina.

**The Health and Safety Division offers the following degree programs:**

- **Master of Public Health degree with a major in Public Health Option in health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational health and safety are also available.**

- **Master of Science degree with a major in School Health Education or Safety Education and Service (thesis and non-thesis options).** Non-thesis option requires 45 quarter hours of course work.

**Educational Specialist degree in Safety Education and Service.**

- **Doctor of Education degree in Health Education.**

- **Doctor of Philosophy degree in Health Education.**

**Public Health**

**3000 Foundations of Health Science (3)** In-depth study of major discipline areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international health, personal health practices, reciprocal relationships involving man, disease and environment.

- **3210 First Aid and Emergency Care (4)** Theory and practice of first aid and emergency care. Instruction in medical self-help. Course leads to Red Cross Certification in Advanced First Aid and Emergency Care. (Applicant must be at least 18 years of age for certification.) (Same as School Health 3210.)

- **3310 Communicable and Noncommunicable Diseases (3)** Modern concepts of infectious etiology of common communicable and chronic disease problems including prevention and control. Prereq. 1 yr biological science and 1 course in bacteriology.

- **3320 Sanitation (3)** History of sanitary awakening; disease-producing relationships and control. Water, sewage, refuse; milk, meat and other foods, air, insects, and soil; sanitation of homes, swimming pools, industrial plants, markets, restaurants, camps, and public places. Healthful school living as affected by buildings and grounds, lighting, acoustics, thermal control, and ventilation provisions. Prereq. 1 yr biological science, 1 course in microbiology, 2 hrs and 1 lab.

- **4210 Urban and Industrial Health (3)** Health problems created by a burgeoning population and the megacities: industrial and occupational problems of concern to management, supervisor, and industrial worker; control of occupational diseases, poisons, accidents, and other conditions incidental to industry.

- **4220 Communications for Better Health (3)** Selective study of communications in health enterprise. Consideration of legal and ethical problems of transmitting current and new information to practitioners; communications among members of the modern health teams, among health agencies, and use of mass media for transmitting health information.

- **4410 Consumer Health and Safety Education (3)** Survey of major consumer health and safety problems; selecting, purchasing, and financing of safety and medical services.

- **4411 Instructor's Advanced First Aid and Emergency Care (3)** Designed to teach first aid. Satisfactory completion for American National Red Cross Certification as an Advanced First Aid and Emergency Care Instructor; certificate must be at least 21 years of age. Prereq.: 3210 or valid Advanced First Aid and Emergency Care Certificate.


- **4700-10-20 Field Practice in Public Health (3, 3, 3)** Field practice in public health under supervision of public health profession. S/N only.

- **4730 Workshop in Public Health Education (3-4)** For teachers, nurses, case workers, sanitarians, and other voluntary and public health agency personnel; emphasizes the problem-solving approach through small group interaction, case method, and critical incident technique. May be repeated.

- **4840-50-60 Problems in Public Health Education (1, 1, 1)** Individual identification and study of current problems in public health education. Extensive reading of literature required.

- **5002 Non-Thesis Graduation Completion (3-15)** Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only.
5010-20-30 Workshop in Public Health (3-6, 3-6) Designed to deal with specific public health problems in short or extended period of time.

5070-80-90 Field Practice and Seminar in Public Health (3-6, 3-6, 3-6) Internship or field experience under professional supervision in public health. S/NC only.

5110 Environmental Health (3-6) Varied environmental factors within general framework of air, food, water, shelter, transportation as they affect man's survival, prevention of disease, personal and social enjoyment. Lecture, demonstration, laboratory, and field practice. Prereq: Consent of instructor.


5150 Industrial Toxicology (3) Elements of industrial toxicology as they relate to the improvement of occupational health and safety. Prereq: Consent of instructor.

5220 Health and Sickness in the Focus of Public Health Education (2) Formulation of models of positive health within life cycle and within community; types of sickness afflicting individuals and groups. 1 hr and 2 labs.

5410 Epidemiology (3) Incidence and prevalence of disease in human population.

5420 Administration of Public Health (3) Administrative considerations of public health agencies including governmental aspects, legal bases, organizational, and supervisory aspects. Personnel factors, fiscal management, and public relations.

5430 Vital and Medical Statistics (4) Application of basic statistical principles to living things.

5440 Methods and Materials in Public Health Education (4) Theory and practice in use of communication techniques and materials in community health education. 3 hrs and 2 labs.

5540 Factors in Problem Solving for Community Health (3) Test skills in communications and group process en route to problem identification, objective setting, problem solving and planning for health education. 4 hrs and 2 labs.

5550 The Public Health Educator in Community Organization and Development (4) Overview of health education organizations and agencies in the community; prefaces exploration of conflicting theories and divergent practices of style in community organization and development. Laboratory to delineate a community near campus and to practice. 2 hrs and 4 labs.

5560 Functions and Roles of the Public Health Educator (3) The professional scene is examined with special attention to roles and functions. Consideration of philosophy and motivation and differences between health education service and health education program for community learning levels. 1 2-hr lecture-seminar session per week.

5580 Physical Activity and Health (5) (Same as Physical Education 5580.)

5705-10-15 Advanced Professional Health Education: Health Planning I, II, III (3-5, 3-5, 3-5) Theory and practice in selected areas.

5730 Dental Health Education (3-5)

5735 Emergency Medical Services (3-5)

5745 Family Health Unit (3-5)

5750 Health and Medical Care Legislation and Law (3-5)

5755 Health Facilities Administration (3-5)

5760 Health Services Administration (3-5)

5785 Occupational Health Unit (3-5)

5790 Self-Care Unit (3-5)

5795 The Training of Paramedical Personnel (3-5)


6000 Doctoral Research and Dissertation

6030 Critical Analysis of Writing and Research in Health Education (3) (Same as School Health Education 6030.)

6050-60 Seminar in Health Education (3, 3) (Same as School Health Education 6050-60.)

6210 Health Aspects of Gerontology (3)

6220 Seminar on the Nation's Health (3)

6590 International Health (3)

5790 Special safety problems in a concentrated period of time.


5870-80-90 Current Issues in Safety Education (1, 1, 1)

6010-20-30 Internship and Research in Safety (3, 3) Allows the student opportunities for engaging in field experience so that a significant problem in that experience will be identified, researched, and reported on in acceptable form.

School Health

3210 First Aid and Emergency Care (4) (Same as Public Health 3210.)

3410 School Health Instruction (3) Selection of health content in the school curriculum.

3420 School Health Services (3) Development, maintenance, and protection of health of students including examination, screening, special services, communicable disease control, emergency care, and school health records.

3510 The School in Community Health (3) Role of teacher in community health education; school's responsibility in promoting healthful living and the place of existing media and agencies in this role. Not open to health and physical education majors.

3610 Methods in Elementary Health Instruction (3) Preparation and presentation of health topics. Teaching methods emphasized and student participation stressed. Required for elementary teachers. Prereq: 3510 or Public Health 1110 or Nutrition 1230.

3620 The Teaching of Sex Education (3) Trends, content, methods, and materials in sex education.


4710 Workshop in School Health Education (3-6) For advanced students, teachers, school administrators, nurses and other paramedical school personnel. Lecture, demonstrations, films, field trips, and supervised research in special health problems. May be repeated.

4810-20-30 Problems in School Health Education (1, 1) Individual identification and study of current problems in school health education. Extensive reading of literature.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-Thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5320 Behavioral Problems in Safety Education and Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology in development of safe behavior in all segments of our environment.

5330 Problems and Research in Accident Prevention (3) Analysis of safety problems found in wide variety of accidents that occur in community; limitations of current research in behavioral sciences as related to variation incidence of accidents.

5340 Organization, Administration, and Supervision of Safety Programs (3) National, state, and local level programs including administrative, instructional, and supervisory aspects. Basic emphasis on implementation of relevant programs.

5350 Civil and Defense Education (3) Civil and defense problems; tornadoes, floods, fires, mass civil disorders, and nuclear and personnel attack by alien countries.

5720-30-40 Graduate Workshop in Safety (3-6, 3-6, 3-6) Deals with specific safety problems.
several commercially prepared tests and construction and standardization of test.

5530 School Health Program Surveys (3) Techniques and standards used in surveying total school health program; relative contribution of health instruction, health services, and healthful environment as each contributes to well being of individual students. Survey of existing school health program.

5620 School Health Administration and Supervision (3) Analysis of various types of administrative control; budgetary problems; education-public health dilemma; responsibilities of school health personnel. Resource materials include case studies of on-going school health programs.

5630-40 Workshop in School Health Education (3, 3) Designed for graduate students, inservice teachers, and other health professionals. Emphasis in any workshop to be on critical health issues.

5720-30-40 Graduate Workshop in Health Education (3-6, 3-6, 3-6) Deals with specific health problems. Designed especially to explore special health problems in a concentrated period of time.


6000 Doctoral Research and Dissertation

6020 Critical Analysis of Writing and Research in Health Education (3) (Same as Public Health 6030.)

6030-60 Seminar in Health Education (3, 3) (Same as Public Health 6050-60.)

Division of Physical Education

MAJOR

DEGREES

Physical Education

M.S., Ed. D.

Professors:

J. E. Acker, M.D. Tennessee; G. F. Brady (Emeritus), Ph.D. Iowa; E. K. Cape (Emeritus), Ph.D. Iowa; D. D. Franks (Chairperson), Ph.D. Illinois; A. J. Kozar, Ph.D. Michigan; W. P. Lienhoft, Ph.D. Iowa; M. M. Phillips, Ph.D. Iowa; D. A. Peterson, Ph.D. Minnesota; H. B. Watson, Ph.D. Michigan; H. G. Welch, Ph.D. Iowa; B. D. Franks (Chairperson), Ph.D. Iowa; E. K. Capen (Emeritus), Ph.D. Iowa; B. D. Franks (Chairperson), Ph.D. Boston; H. B. Watson, Ph.D. Michigan; H. G. Welch, Ph.D. Iowa.

Associate Professors:

E. T. Howley, Ph.D. Wisconsin; N. E. Lay, Ph.D. Florida State; B. J. Mead, Ph.D. Purdue.

Assistant Professors:


The Physical Education Division offers the following degree programs:

Master of Science degree in Physical Education (thesis and non-thesis programs).

Doctor of Education degree in Physical Education with concentrations in exercise physiology, anatomy and kinesiology, adaptive physical education, and general physical education.

3050 Rhythmic Analysis (2) Emphasis on analysis of organic movement. Prereq: Consent of instructor.

3060 History of Dance and the Related Arts I (2) Dance history and the arts related to it from beginnings in primitive societies through the nineteenth century.

3151 History of Dance and the Related Arts II (2) Survey of dance and the arts related to it, tracing their development in the twentieth century.

3430 Adaptive Physical Education Laboratory (1) Practical experience in refereed student teaching, supplementing 4110.

3710 Camping (2) Theory and practice in leadership with practical experience in camp craft skills. Not for graduate credit for physical education majors.

3880 Social Recreation (3) Theory and practice in social recreation for camps, community centers, clubs, and schools. Course includes folk and square dance, quiet and active games, skills, stunts, other recreational activities, and program planning. Not for graduate credit for physical education majors.

4010 Advanced Dance Technique (2) Development, integration, and synthesis of previous dance vocabulary; emphasis on analysis and practice of dance principles; solo and group work. Prereq: 3020.

4020 Practicum in Dance Production (2) Prereq: Consent of instructor.

4060 Advanced Dance Composition (2) Creation and development of ideas, themes, and dance forms; solo and group work. Prereq: 3060.

4070 Stagecraft for Dance Production (2) Equipment, light design, properties, sets, and stage management.

4110 Adaptive Physical Education (3) Classification of atypical students who require modified programs in physical education; activities and class organization suitable for required or special physical education classes.

4150 Creative Rhythms for Children (3) Methods and materials for grades 1-6.3 hrs and 1 lab.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5110 Administrative Problems in Health and Physical Education (3)

5120 Problems of the Curriculum in Physical Education (3)

5130 Methods in Physical Education (3) Characteristics of different school age levels, and applications of learning procedures in physical activities at these levels.

5140 Advanced Philosophy of Sport (3) Critical examination of the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5150 Systematic Philosophical Analyses of Sport (3) Critical examination of the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5160 Scientific Bases for Physical Education (3) Historical, psychological, and sociological foundations.

5190-20-30 Seminar in Physical Education (1, 1, 1) Current issues and problems in physical education with emphasis on outstanding studies and research in field.

5190-20-30 Problems and Projects in Physical Education (1-3, 1-3, 1-3) Problems of professional interest and value to the individual student, selected by the student and approved by the major professor. S/NC only.

6000 Doctoral Research and Dissertation

6010 Seminar in Physical Education (1) Research topics in literature related to physical education. May be repeated with consent of instructor. S/NC only.

6220 Independent Research (3) Selection of topic, development of procedure, and conduct of study including final writing of research paper. S/NC only.

6410 Practicum in Kinesiology (3) Electromyography laboratory and film analysis of sports skills. Prereq: 5310, 5500 and Physics 2210 or equivalent. May be repeated with consent of instructor. S/NC only.

6510-20 Issues and Problems in Physical Education (3, 3) Critical examination and evaluation of current issues and problems in physical education.

6610 Seminar in Applied Physiology (2) Prereq: 5610. May be repeated with consent of instructor. S/NC only.

6640 Research Participation in Applied Physiology (1-4) Advanced research techniques under supervision of faculty member who research area coincides with interests of student. Prereq: Consent of instructor. May be repeated with consent of instructor. S/NC only.

6810-20 Practicum (2, 2) Intern experience in areas of major interest. S/NC only.
Division of Recreation

MAJOR DEGREE
Recreation M.S.

Professor: M. L. Peters (Chairperson), Ph.D. Illinois.
Assistant Professors: M. L. Carter, Re.D. Indiana; K. L. Krick, Re.D. Indiana.

The Recreation Division offers the following degree program:
Master of Science degree in Recreation (thesis and non-thesis programs) with concentrations in general recreation, recreation administration, and therapeutic recreation.

4150 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, areas and facilities, program services, finances, and public relations. Prereq: 3140, 3200, 3880, or consent of instructor.

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation profession to minority groups whose leisure opportunities and needs may require special servicing. Prereq: 3140, 3200, 3880, or consent of instructor.

4500 Specialized Study in a Selected Area of Recreation (1-9) Comprehensive study in a selected specialized area within the broad field of recreation. For recreation students only. Prereq: Consent of instructor. May be repeated with consent of division. Maximum 9 hrs.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5130 Interpretations of Leisure (3) Concepts of leisure including social, psychological, cultural, and philosophical; recreative uses of leisure. Prereq: 3140 or consent of instructor.

5140 Leisure Service Delivery Systems (3) Various systems—public, private, and commercial—involved in provision of leisure services for community at large. Prereq: Consent of instructor.

5150 Current Issues in Recreation (3) Identification and consideration of broad issues—social, environmental, ethical—which currently have greatest impact on use of leisure, and implications for recreation administrator. Prereq: Consent of instructor.

5240 Therapeutic Recreation (3) Role of recreation in lives and treatment of persons with disabilities—mental, physical and medical. Possibilities for helping ill and disabled realize their fullest potential. Prereq: Consent of instructor.

5250 Implementations of Recreation Services for the Ill or Disabled (3) Policies and guidelines for organizing and implementing programs of recreation for ill or disabled in treatment centers and other community agencies. Prereq: 4200 or consent of instructor.

5260 Leisure and Mental Health (3) Relationship between leisure activity and mental health, with emphasis on its use in therapeutic recreation. Prereq: Psychology 3650 or equivalent, and consent of instructor.

5300 Seminar in Recreation (1) Presentation and general discussion of students' research studies, projects, and thesis in recreation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

5340 Administration of Recreation Funds (3) Development and management of budgets for recreation agencies with special emphasis on obtaining federal funds appropriated specifically for recreation, management of revenue received, and exploration of funding alternatives. Prereq: 4100.

5350 Organizational Policies for Recreation (3) Advanced study in the analysis of organizational policies and functions of management in recreation. Prereq: 4130.

5360 Management and Operation of Recreation Facilities (3) Management process as it pertains to operation of recreation facilities.

5440 Problems and Projects in Recreation (1-9) Individual research on problem of special significance to student. Research projects of limited nature undertaken in lieu of thesis. May be repeated. Maximum 9 hrs. New problem must be undertaken for each repetition.

5450 Specialized Study in Recreation (1-9) Advanced comprehensive study in selected specialized area within leisure and recreation field. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
Graduate degree programs of the College of Engineering provide opportunities for advanced study leading to the Master of Science degree, the Master of Engineering degree, and the Doctor of Philosophy degree. For a listing, consult majors and degrees available on page 8.

OFF-CAMPUS GRADUATE INSTRUCTION BY VIDEOTAPE-ELECTROWRITER

Since 1966, the College of Engineering has made use of electronic communication techniques to reach students beyond the confines of Knoxville classrooms. These remotely-taught classes make the specialized talents of engineering college faculty available to students at off-campus centers and industrial sites. This effort makes use of videotapes prepared from a regular on-campus class in specially-equipped classrooms. The tapes contain a visual and audible record of a professor's lecture and discussions with the on-campus classes. When the tapes are played back at remote locations, telephone/Electrowriter contact is established between the professor and the off-campus class to allow full discussion and questions before or after a tape is played. Periodic visits by the professor are made to each remote class or students visit the Knoxville campus at selected times.

Graduate courses have been offered to students at other campuses and established centers of the UT System (Chattanooga, Kingsport, Martin, Nashville, and Tullahoma). A limited number of graduate courses have also been made available to engineers in industrial plants. Such courses are also offered to students using classroom facilities at Jackson State, Columbia State, and Walters State Community Colleges.

The remotely-taught courses offered by UTK carry full graduate credit toward the Master's degree under authorization of the regional accrediting agency, the Southern Association of Colleges and Schools.

YEAR-IN-JAPAN M.S. PROGRAM

This is a unique program allowing American engineering students to develop some understanding, both scientific and cultural, of Japan. It allows an M.S. candidate to obtain a degree from UTK while carrying out research work at a Japanese university. The program requires approximately two years, one year being spent in Japan and the remaining period being spent at UTK to fulfill the course requirements and to write the thesis or project report, as appropriate to the particular department. The program is administered in the framework of each department's regular graduate program except that the research is done in Japan.

Although the language of communication in Japan would be English, cultural understanding is one of the important objectives of the program and as such a participant would be asked to begin Japanese language study. At the option of the department, up to 6 hours of graduate credit may be allowed for language study, either at UTK or in Japan.

Financial support for living expenses in Japan and for the roundtrip transportation can usually be arranged through fellowships from the Japanese Ministry of Education.

Alumni Distinguished Service Professor.

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administration, and students with such interests are advised to consider graduate programs available in the College of Business Administration.

To be admitted to the Graduate School as a potential candidate for a Master's degree, with a minor in Engineering Administration, the applicant must submit reasonable evidence of ability to pursue graduate studies at an acceptable level of performance. In general, the applicant should have graduated from a recognized undergraduate institution in engineering with a satisfactory grade point average. In addition, applicants must satisfy one of the following experience requirements:

1. At least two years of engineering experience after graduation if a full-time student or (2) current employment in engineering work if a part-time student.

THE MASTER'S PROGRAM

Minimum requirements for the Master's degree are the satisfactory completion of the following:

1. An Engineering Core, 27 hours of graduate credit consisting of Engineering Administration 5900, at least three courses chosen from Industrial Engineering 4150, 5110, 5520, and 5710, and a complement of engineering courses normally selected from the student's undergraduate major department or from courses of other departments pertinent to the program.

2. A Business Administration Core, 15 hours of graduate credit consisting of Accounting 5810, Finance 5050, Marketing 5051, Management 5130, and Transportation 5210.

3. General Electives, 9 hours of graduate credit chosen from computer science, economics, engineering, management science, mathematics, psychology, statistics, and other program-related disciplines.

The program requirement totals 51 hours of graduate credit. No thesis is required. A final oral and written examination must be passed on the work offered for the degree. Course prerequisites for the program are Accounting 2110, Computer Science 3150, Industrial Engineering 4520, and Statistics 3450 or their equivalents. None of these prerequisites may be counted as part of the 51 hours of credit offered for the degree. These course prerequisites will be waived upon presentation of evidence of competency in the course subjects. Other prerequisite courses may be required, depending upon the student's background and the electives chosen.

5002 Non-Thesis Graduation Completion (3-15)

Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5900 Project Engineering Administration (3)

Study and formal report of engineering administration topic, normally performed during last quarter of work toward degree. For M.S. in Engineering Administration candidates only. May be repeated. Maximum 3 hrs credit to be applied toward degree. Must register for 5900 until project is complete. S/NC only.

Departments of Instruction

Numbers in parentheses following the course titles indicate quarter hours credit offered.

Chemical, Metallurgical, and Polymer Engineering

MAJORS

Chemical Engineering
Metallurgical Engineering
Polymer Engineering

DEGREES
M.S., Ph.D.
M.S., Ph.D.
M.S., Ph.D.

Professors:
H. F. Johnson (Head), D. Eng. Yale;
D. C. Bogue, Ph.D. Delaware; B. S. Borie, Ph.D. Massachusetts Institute of Technology;
C. R. Brooks, Ph.D. Tennessee; E. S. Clark, Ph.D. California (Berkeley); L. W. Crawford, Ph.D. Cincinnati; O. L. Culp, Ph.D. Texas;
J. F. Fellers, Ph.D. Akron; G. C. Frazier, Ph.D. Johns Hopkins; J. M. Holmes, Ph.D. Tennessee;
H. W. Hsu, Ph.D. Wisconsin; S. H. Jury (emeritus), Ph.D. Cincinnati; C. D. Lundin, Ph.D. Pennsylvania;
P. E. Ransdell, Polytechnic; C. J. McHargue, Ph.D. Kentucky;
C. F. Moore, Ph.D. Louisiana State;
B. F. Oliver, Ph.D. Tennessee State;
J. J. Perona, Ph.D. Northwestern; J. W. Prados, Ph.D. Tennessee; E. J. Sproul, Ph.D. Tennessee; E. E. Stansbury, Ph.D. Cincinnati;
C. O. Thomas, Ph.D. Tennessee;
R. A. Vandermeer, Ph.D. Illinois Institute of Technology; J. W. Watson, Ph.D. Tennessee;
J. J. White, Ph.D. Delaware; M. A. Wright, Ph.D. Wales.

Associate Professor:
W. T. Becker, Ph.D. Illinois.

Assistant Professors:
D. D. Burns, Ph.D. Houston; P. J. Meschter, Ph.D. Pennsylvania.

Lecturers:
T. D. Parish, Ph.D. Rice; W. H. Seaton, Ph.D. Ohio State; E. von Halle, Ph.D. Tennessee;
M. E. Whitney, Ph.D. Iowa State.

Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy in Chemical Engineering with concentrations in chemical engineering, chemical bioengineering, advanced control systems, and polymer science and engineering, in Metallurgical Engineering, and in Polymer Engineering.

THE MASTER'S PROGRAM

Minimum departmental requirements include the satisfactory completion of:

1. A major consisting of 18 to 27 quarter hours of graduate courses in chemical engineering, metallurgical engineering, or polymer engineering. The polymer engineering major must include Polymer Engineering 4920, 5110, 5230, 5310, and 5510.

2. One or two minors or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or other related fields.

3. Master's thesis, 5,000, totaling 9 to 18 quarter hours.

4. Active participation in graduate seminars in the department. Resident students must register for the appropriate 5010 every quarter offered.

5. Final examination covering thesis, related fields, and graduate course work.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must display concrete evidence of ability to perform independent research and to the satisfaction of the department. The Master's thesis may be offered as such evidence.

Department requirements consist essentially of the satisfactory completion of:

1. Graduate courses in chemical engineering, metallurgical engineering, or polymer engineering amounting to approximately 36 quarter hours, at least 12 of which must be in 6000 series courses. The polymer engineering major must include Polymer Engineering 4920, 5110, 5230, 5310, 5510, and Chemistry 5140.

2. Supporting courses in related scientific and engineering fields amounting to a minimum of 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.

3. The preliminary examination, usually given in two parts, and covering such material as chemical, metallurgical, and polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.

4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 5010 every quarter offered.

5. Reading knowledge of a foreign language relevant to the candidate's research program; selection of language to be made in consultation with the faculty committee. Appropriate languages are French, German, Italian, Japanese, and Russian.

PROGRAM OPTIONS IN POLYMER SCIENCE AND ENGINEERING

M.S. and Ph.D. degrees with specialization in polymer science and engineering are possible through two routes—one in the department (through chemical or metallurgical engineering) with an engineering emphasis, and a second in a joint program with the Chemistry Department having a chemical emphasis.

The specialization program in this department requires, for the M.S. degree, a thesis in the field, completion of Polymer Engineering 4910, 4920, 5110, and either 5230 or 5210 plus active participation in the Polymer Seminar. The Ph.D. candidate must meet the above requirements, pass a special written examination in polymer science and engineering, and complete an additional academic program to be specified by the student's committee.

M.S. and Ph.D. degrees in the joint specialization program with the chemistry department require a thesis or dissertation in the field. Chemical and metallurgical engineering departmental requirements include completion of...
Polymer Engineering 4910 and 4920, Chemistry 5531 and 5140, plus active participation in the Polymer Seminar. Prereq: Chemical and Metallurgical Engineering 2020, Mathematics 2850. 3 hrs and 1 lab.

3420 Heat Transfer (4) Differential and overall energy balances; heat transfer; film transfer; application, including humidification, gas absorption, extraction. Prereq: 3420, Chemical Engineering 3040.

3610 Introduction to Process Dynamics and Control (3) Basic concepts of process dynamics and control. Steady-state analysis of chemical process control systems. Unsteady state analysis of chemical processes. Laplace transforms, block diagram algebra and transfer functions. Mathematical models for several processes are developed and analyzed in detail. Prereq: Mathematics 2840.

3620 Chemical Process Control (3) Basic control theory applied to chemical processes: feed-back control, cascade control, feed-forward control, stability analysis, frequency response. Survey of modern control of typical industrial unit operations. Prereq: 3610.

4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system extendability; statistical properties of samples and source systems; empirical modeling of processes; statistical process control. Prereq: 3420 and Mathematics 3150.


4130 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design; unconstrained optimization, equality constrained optimization, inequality constrained optimization, optimal investment, operating costs and economic merit. Prereq: 4410, 4530.

4200 Process Design and Economic Analysis (3) Development of basic information on a process into an integrated plant design considering mass and energy balances, product specifications, equipment costs, characteristic operating costs, operating costs and economic merit. Prereq: 4410, 4530.

4300 Special Problems in Design and Economics (3) Extension of 4420 for student participation in the American Institute of Chemical Engineers annual contest problem; other advanced design projects. Prereq: 4420.

4420 Hydrocarbon Processing (3) Study of specialized characterization of physical properties of fossil fuel raw materials and products, and of processes for conversion of fossil fuel raw materials into products needed in industrial energy, industrial raw material and consumer markets. Prereq: 3440.

4470 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of domestic coals; beneficiation by both physical and chemical methods; fluidized bed combustion with both natural and synthetic SO2 scrubbing. Prereq: Consent of instructor.

4480 Coal Processing to Liquids and Fuels (3) Characterization of various coals with respect to current liquefaction methods; modeling of conversion processes and estimation of maximum yields; water and oxygen requirements; pyrolysis; catalytic hydrogenation; reactor design considerations; review and critique of selected articles from both the current literature and patents. Prereq: Consent of instructor.

4530 Chemical Engineering Reaction Kinetics (3) Chemical reaction rates in closed and flow systems; interpretation of laboratory and pilot plant data; reactor design. Prereq: 3420, Chemistry 3430, Chemical and Metallurgical Engineering 3400.


4620 Process Modeling, Simulation, and Control of Chemical Processes (3) Advanced process models, experimental process identification, process computer simulation, conventional and nonconventional feedback control, advanced control concepts. Prereq: 3620 or equivalent background in basic control theory and differential equations.

4730 Mass and Energy Flow in Biological Systems (3) Basic physicochemical and organizational principles applicable to biological systems. Derivations of general equations for biomass and energy transfer. Thermodynamics of transport and equilibrium in biological systems. Discussion of Volterra's equation and biological clocks. Prereq: Consent of instructor.

4740 Introduction to Transport Phenomena in Biological Systems (3) Application of principles of transport phenomena to biological systems. Transfer of chemical energy and various cellular active transports; structure and rheology of physiological fluids, membrane and interfacial phenomena; analysis and design of artificial organs. Prereq: 3440, 3450 or consent of instructor.

4750 Microbiological Process Engineering (3) Application of chemical engineering principles and design concepts to microbiological processes, continuous culture of microorganisms, food processing, and air pollution control processes. Prereq: 3440, 3450 or consent of instructor.

4760 Principles of Biochemical Separation (3) Fundamental aspects and similarities of modern biochemical separation methods; classroom demonstrations, design of production and analytical systems. Prereq: Consent of instructor.

4781-82-83 Topics in Chemical Bioengineering (3, 3, 3) Problems of interest in chemical bioengineering. Prereq: Consent of instructor.

5000 Thesis 5019 Graduate Seminar (1) May be repeated. Prereq: Admission to graduate program.

5050 Engineering Analysis (3) Analytical formulation and solution of chemical, metallurgical and polymer engineering problems involving deformation of solids, heat transfer and motion of fluids, transport phenomena, chemical engineering 5050 and Polymer Engineering 5050.

5120 Heat Convection (3) Analysis of heat convection in fluids under viscous and turbulent flow conditions, application of chemical engineering approach; simultaneous diffusion of momentum and heat. Prereq: 5050.

5130 Methods of Optimization (3) Principles and applications of various mathematical programming techniques to chemical process design and control; variation methods, integer programming, dynamic programming, and geometric programming. Prereq: 4130.

5210 Process Dynamics (3) Analysis of recycle operations, steady state oscillations, and optimization of typical processes.

5250 Chemical Process Industry Economics (3) Analysis of economic components of chemical processes, linear methods, indifference curve, chemical enterprises, decision making for investment and capital facilities. Prereq: 4120-30, 4420.

5510 Thermodynamics of Heterogeneous Equilibrium (3) Phase rule; equilibrium between phases; composition relationship between phases; ideal and nonideal solutions. Prereq: 3040.

5520 Statistical Thermodynamics (3) Basic concept of statistical mechanics and application to evaluation of thermophysical properties. Prereq: 5310.

5410-30-30 Research and Design in Chemical Engineering (3, 3, 3) Selected diffusional operations; interpretation of laboratory data and design of experiments in chemical engineering research.

5610 Chemical Reactor Design (3) Nonideal flow patterns in chemical reactors; diffusion and reaction. Two phase systems and heterogeneous catalysis and reactor stability. Prereq: 4530.

5610 Stage-wise Mass Transfer Operations (3) Equilibrium stage concept applied to mass transfer operations, emphasizing nonisothermal and multicomponent systems.

5620 Differential Mass Transfer Operations (3) Differential mass transfer operations; falling film, packed tower and bubble contacting devices; nonisothermal and multicomponent systems; current theories of mass transfer, mass heat and momentum transfer analogies. Prereq: Mathematics 2840.

5810 Mechanics of Viscous Flow (3) (Same as Engineering Science and Mechanics 5220.)

6000 Doctoral Research and Dissertation

6130 Process Optimization (3) Optimization of chemical process equipment and systems by various techniques; static and dynamic systems. Prereq: 5130.

6210 Advanced Diffusional Operations (3) Fixed and fluidized bed operations, stage-wise and diffusional mass transfer bed concepts. Prereq: Consent of instructor.

6250 Venture Analysis in the Process Industries (3) Interactions among line functions of typical chemical company in application of modern decision theory and mathematical models to achieve optimum product investment decision in face of external competition. Prereq: 5250.

6310 Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemical processes, transport processes, coupling phenomena, with special emphasis on topology and methods important to chemical engineering and bioengineering students. Prereq: 5310.


6420 Stability Phenomena in Chemical Engineering (3) Hydrodynamic instabilities and instabilities in fluids based upon

6510 Applied Chemical Reaction Kinetics (3) Chemical reaction rates and gas and liquid phases, heterogeneous catalysis, catalyst effectiveness and selectivity, and fundamentals of kinetics. Emphasis on development of phenomenological description although mechanistic models are discussed. Prereq: 5510.

6520 Catalytic Reactor Design (3) Principles of kinetic and heat and mass transfer applied to design and analysis of heterogeneous catalytic reactors. Prereq: 6510.

6610 Special Topics in Chemical Engineering (3) Advanced problems of current interest to chemical engineers. Prereq: Consent of instructor.

6710 Process Dynamics (3) Development of dynamic models of process equipment from conservation and rate laws; testing of models by frequency, step, and pulse response methods. Prereq: Consent of instructor.

Metallurgical Engineering

3110 Engineering Materials I (4) Introductory course correlating the atomic, crystal, and microstructure of solids with mechanical, physical, and chemical properties of engineering significance. 3 hrs and 1 lab.

3120 Engineering Materials II (3) Extension of 2110 or 3110 with emphasis on control of mechanical properties of materials by specification of thermal and mechanical treatments; correlation of resultant properties with service performance. Suggested for mechanical, civil, and industrial engineering students.

3130 Engineering Materials III (3) Extension of 2110 or 3110 with emphasis on control of electric and magnetic properties of materials by specification of composition, thermal, and mechanical treatments; correlation of resultant properties with service performance. Suggested for electrical engineering students.

3140 Engineering Materials IV (3) Extension of 2110 or 3110 with emphasis on materials processing, specification and evaluation. Suggested for mechanical and industrial engineering students.

3150 Engineering Materials V (3) Extension of 3110 with emphasis on the mechanisms and control of reactions of engineering materials with aqueous and nonaqueous environments. Prereq: 3110 or equivalent.

3160 Engineering Materials VI (3) Extension of 2110 or 3110 with emphasis on materials of significance in aerospace, space, and nuclear engineering. Suggested for aerospace and nuclear engineering students.


3220 Diffusion and Annealing (3) Introduction to solid state kinetics; point defects, solid solutions, diffusion equations and mechanisms, annealing of cold worked structures. Prereq: 3210; Mathematics 2840.

3230 Phase Transformations (4) Thermodynamic and structural factors governing binary equilibrium. Ternary systems. Kinetics and morphology of phase transformation and phase transformations in simple and complex systems. Prereq: 3220. 3 hrs and 1 lab.

3310 Biomedical Applications of Materials for Life Sciences (3) Principles of engineering materials; metals, polymers, and ceramics; methods of fabrication of components; corrosion; applications of prosthetic devices and dental materials. Prereq: Chemistry 1110-20-30 or equivalent.

3520 Materials Behavior and Chemical Processing Equipment Design (3) Mechanical, metallurgical and chemical considerations in design of chemical processing equipment. Prereq: Chemical and Metallurgical Engineering 3010 or equivalent; 3150; and Chemical Engineering 3420. (Same as Engineering Science and Mechanics 3520.)

3710 Metallurgical Applications in Manufacturing Technology (3) Graduate project and principles of mechanical/thermal processing for finished and semifinished articles; casting, powder metallurgy, plastic forming, joining, heat treatment. Prereq: 2110 or equivalent.

4240 Engineering Materials Design (3) Property control through composition, heat treatment and transformation in ferrous alloys. Plain carbon steels, alloy steels, and tool steel processing for property selection and service requirements. Prereq: 3230 or consent of instructor.

4250 Design and Analysis (3) Design and laboratory investigations in design, processes and performance in engineering structures and components. Prereq: Senior standing.

4540 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 4540.)

4610 Physical Properties of Materials (3) Electromechanical properties of solids, types of bonding in solids; thermal, electrical, and magnetic properties of materials; relationship between metallurgical structure and properties. 3 hrs, or 2 hrs and 1 lab.

4710 Production Metallurgy (3) Thermodynamic and kinetic principles of roasting, smelting, refining. Prereq: Chemical and Metallurgical Engineering 3420.

4730 Mechanical Metallurgy I (3) Elastic behavior. Description of stress, strain, and elastic constitutive relations. Effects of composition, microstructure, and loading on mechanical behavior. Failure by yielding. Prereq: 2110 or 3110 or Chemical and Metallurgical Engineering 2030. Suggested for mechanical engineering, engineering mechanics and engineering science students. 3 hrs, or 2 hrs and 1 lab.

4740 Mechanical Metallurgy II (3) Ductile and brittle fracture, creep and stress rupture, fatigue, fracture, ductility, and strengthening mechanisms. Internal stresses, solidification, and solid state reactions, for both simple and complex alloys. Current theories of cold cracking, hot cracking and porosity formation are developed. Prereq: Physical metallurgy.

5120 Plastic Deformation III (3, 3) Fundamentals of plastic deformation, applications of Baker-Huttner theory, crystallography and atomic planes, dislocations, analysis of deformation and creep, microstructural description of deformation and annealing of point defects and cold work.

5150 Phase Transformations I (3) Analysis of models and experimental observations relating to phase transformations by nucleation and growth; solidification, precipitation, spinodal decomposition. Prereq: 5140.

5170-80 Plastic Deformation III (3, 3) Fundamental analysis of crystal plastic behavior. Prereq: 5170.

5210-20-30 Welding Metallurgy (3, 3, 3) Welding processes and physical metallurgy of welding, including power, arc, resistance, inductive, laser, electron beam, thermal spray, plasma, solidification, and solid state reactions, for both simple and complex alloys. Current theories of weld cracking and porosity formation are developed. Prereq: Physical metallurgy.

5310 Solidification and Crystal Growth I (3) Solute redistribution, thermal boundary conditions, kinetic, convection and fluid flow effects on the solid to liquid transition. Prereq: Mathematics 4550.

5410-20-30 Advanced X-Ray Diffraction (3, 3, 3) Prereq: 5410. Use of mathematical and physical theories of x-ray crystallography and nuclear physics; chemical diffraction theory, analysis of scattered intensity in reciprocal space; relationship of scattered intensity to thermal motion, order-disorder, particle size and lattice faults. Introduction to crystal symmetry, space group theory, and crystal structure problems; some laboratory work. Prereq: Mathematics 4610.

5510-20 Applied Properties of Solids (3, 3) Properties of solids; crystallography, x-rays, properties of single crystal, polycrystal, and binary alloys; mechanical behavior; principles of cold deformation and fracture. Prereq: 5510.

5520-50 Electron Microscopy I and II (3, 3) Kinematic and dynamical diffraction theories are developed and the special aspects of microdiffraction patterns and contrast effect in transmission electron microscopy are discussed. Special attention is given to metallurgical applications such as plastic deformation, fracture, precipitation, and phase transformations. Prereq: 4510-20.


5750 Corrosion (3) Analysis of corrosion processes in terms of polarization measurements and the Pourbaix diagram, influence of stress, temperature, and localized conditions contributing to pitting, crevice, and stress corrosion.

5750-20-30 Special Topics in Metallurgy (3, 3, 3) Lectures and recitation courses in recent advances in metallurgy and related fields.
5910-20-30 Metallurgical Thermodynamics (3, 3, 3) Phases of solid state physics applicable to metal- lurgical engineering, including introductory quantum theory of specific heats, electron theory, electrical and thermal conductivity, magnetic properties, theory of dislocations. Prereq: 6810-20. Coreq: Math 3720; Mathematics 4550 and consent of instruc tor.

6910-20-30 Recent Advances in Polymer Science and Engineering (3, 3, 3) Treatment of latest developments in science and technology of polymers. May include topics of morphology, structure, characterization. Prereq: Consent of instructor.

6210-20-30 Rate Process in Metallurgy (3, 3, 3) Theoretical and practical considerations of rate processes in solids such as diffusion, recrystallization and grain growth, and phase transformation.

6320-30 Solidification and Crystal Growth II and III (3, 3) Fluid flow, magnetohydrodynamic effects in incompressible liquid conductors, mor phological stability of steady state coupled heat and mass transfer processes in liquids to solid transition, multiphase solidification, composites, nonconventional solidification phenomena, some nucleation phenomena. Prereq: 5310.

6410-20 Thermodynamics of Solids (3, 3) Classical and statistical thermodynamic analysis of stability of solid solutions, compounds and ordered phases. Prereq: 5910-29-30 or consent of instructor.

6810 Mechanical and Physical Properties of Crystals I (3) Anisotropic behavior of crystalline materials treated by matrix and tensor techniques. Property classification according to transformation behavior. Prereq: Coreq in Mechanical Engineering and Mathematics 4605 or 4710 or consent of instructor.

6820 Mechanical and Physical Properties of Crystals II (3) Continuation of Metallurgical Engineering 6810 with emphasis on transport phenomena and irreversible thermodynamic. Prereq: 6810 or consent of instructor. May be repeated.

Polymer Engineering

4100 Applied Polymer Science (3) First course in the physical properties of polymers. Polymer structure, crystalline and glass transitions, physical properties of amorphous and crystalline polymers, crystallization kinetics and mechanical properties are discussed.

4290 Polymer Processing (3) Rheological properties of polymer melts and solutions, viscometry, unit operations of fiber, plastics and rubber industries: dimensional analysis and scale-up, flow through dies and pipelines, screw extrusion, spinning of fibers, injection molding.

4930 Principles of Fiber and Textile Engineering (3) Chemical and crystalline structure of important fibers; melt and wet dry spinning of man-made fibers; drawing and texturizing; preparation of yarn; dyeing, weaving and knitting. Emphasis on quantitative aspects.

4940 Polymers Fabrication Operations (3) Lecture and laboratory course treating unit operations of the plastics industry. Types and mechanisms of operations, equipment, and the structure and properties of fabricated parts. Operations to include extrusion, coextrusion, injection molding including transfer, blow molding, rotational molding.

5000 Thesis

5010 Graduate Seminar (1) May be repeated. Prereq: Admission to graduate program.
THE MASTER'S PROGRAM

The Master of Science programs in Civil Engineering and in Environmental Engineering consider the requirements of the professional engineering curricula.

Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering or a related field. For related fields, prerequisite courses must be taken before admission to candidacy for the Master of Science in Civil Engineering.

CIVIL ENGINEERING

The Department of Civil Engineering offers two options for the Master of Science in Civil Engineering.

Option I: A minimum of 45 quarter hours, including at least 9 hours of thesis, is required.

Option II: A minimum of 48 quarter hours, including a 3 quarter-hour special problem, is required. The special problem will culminate in a written report which must be approved by the student's major professor.

ENVIRONMENTAL ENGINEERING

For a major in Environmental Engineering, the Bachelor's degree may be in fields other than civil engineering. In some cases prerequisite undergraduate courses may be indicated, and in general these must be completed before courses for graduate credit can be taken.

The Department of Civil Engineering offers both thesis and non-thesis options for work toward the Master of Science degree in Environmental Engineering.

Option I: The student must present a minimum of 45 quarter hours of approved graduate courses. The major shall include a minimum of 9 quarter hours of thesis, subject to approval by the student's faculty committee. These related fields may include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 12 quarter hours of thesis will be required beyond the civil engineering undergraduate requirements.

Option II: The student must present a minimum of 48 quarter hours of approved environmental engineering course work. A minor may be selected but is not necessarily required.

CIVIL ENGINEERING

4120 Concrete Design (3) Reinforced concrete beams and floor slabs; footings, and retaining walls. Prereq: 4110 and 4410.

4220 Foundations and Substructures (3) Foundations; principles of design of deep and subaqueous foundations. Prereq: 3310.

4230 Legal and Ethical Aspects of Engineering (3) Legal principles underlying engineering work; laws of contracts, torts, agency, real property; problems of engineering ethics. Prereq: 3310.

4240 Structural Design (3) Plastic theory, eccentric connections, industrial building design, timber design. Prereq: 3320 and 4410. 2-3 hr periods.

4280 Photogrammetry (3) Methods of plotting maps from aerial photographs; stereoscopic plotting instruments; applications. Prereq: 2380 or Forestry Summer Camp for forestry majors.

4420 Analysis of Framed Structures (3) Maximum stresses due to moving loads; influence lines; lateral forces due to earthquake and wind; analysis of portals, building frames and space frames. Coreq: 4410.

4430 Construction Methods and Equipment (3) Fundamental operations in construction and selection of equipment; production rates, balancing of equipment, and cost estimates.

4510-20 Advanced Structural Design (3, 3) Plastic design in steel in 4510; design of typical steel spans in highway bridges in 4520. Prereq: 3230 for 4510; and 3230 and 4110 for 4520.

4530 Cost Comparison in Design and Construction (3) Cost of engineering and construction. Cost comparison of alternate designs with emphasis on applications to civil engineering problems. Prereq or coreq: 3230, 4110.
5179 Introduction to Structural Dynamics (3) Analysis of free and forced vibrations, and transient response of structures having many degrees of freedom, elastoplastic behavior considered. Application to structural systems; approximate design methods developed. Prereq: 5120, 5150.

5180 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; plane stress, plane strain, axi-symmetric, and three-dimensional elements; use of typical computer programs. Prereq: 5150, and Engineering Science and Mechanics 5160. (Same as Engineering Science and Mechanics 5160.)

5220 Pavement Design (3) Pavement loads; pavement design; design practices; construction and maintenance. Prereq: 3319.

5240 Advanced Properties of Materials: Cement and Concrete (3) Permeability and durability; volume changes and creep; elastic and thermal properties of concrete, special types of concrete; causes of failure. Prereq: 4710.

5250 Advanced Properties of Materials: Bituminous Substances and Mixes (3) Serviceability concepts; pavement failures and remedies; bituminous mixes; other uses of asphalt products. Prereq: 4720.

5270 Planning and Transportation (3) Preparation of transportation elements of comprehensive development plans. Analysis of relationships between transportation modes and between transportation and other community features. (Same as Planning 5270.)

5310 Engineering Practice (3) Valuation and feasibility studies; association and useful life-long economic economics.

5320-30 Engineering Practice Applied to Administration of Engineering Projects (3, 3) Engineering administration, planning of governmental and industrial projects; cost estimates and methods of financing.

5420 Structural Model Analysis (3) Experimental methods of shear, moment, and stress analysis.


5460-70 Construction Estimating I, II (3, 3) Project costs, estimating techniques; market cost conditions and feasibility of design as it applies to costs. Prereq: 4430 or consent of instructor.

5550 Soil Mechanics—Plastic Equilibrium (3) Failure theories; earth pressure analysis, bearing capacity analysis, and slope stability analysis. Prereq: 3310 or consent of instructor.

5660 Soil Mechanics—Elastic Behavior (3) Stress-deformation characteristics, consolidation, settlement analysis. Prereq: 3310 or consent of instructor.

5700 Soil Mechanics—Seepage (3) Saturated flow through embankments, filter design criteria, seepage forces and velocities, subsidence, and embankment failures. Prereq: 3310 or consent of instructor.

5610 Behavior of Structural Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation between research results and current specifications for design. Prereq: 3320.

5730 Prestressed Concrete (3) Properties of prestressing materials and anchorage systems; methods of pretensioning and posttensioning; analysis and design of members and continuous structures.

5740 Behavior of Reinforced Concrete Members (3) Behavior of reinforced concrete members; relation between research results and current specifications for design. Prereq: 4210.

5800 Urban Systems: Engineering and Management (3) Management of various urban systems usually under city manager and/or city engineer. Organization, finance, personnel administration, purchasing, land use, and management; and dealing with engineering consultants as each deals with municipal public works. Prereq: Graduate standing for Environmental Engineering or consent of instructor.

5850 Urban Systems: Engineering and Management II (3) Continuation of 5800. Management and design of urban streets, including lighting, clearing and snow removal, water supply and waste-water drainage, solid waste, air pollution and regulations. Prereq: 5850.

5810 Traffic Engineering—Characteristics (3) Driver-vehicle-roadway system; level-of-service concept of capacity. Coreq: Statistics 3450 or 5511. 2 hrs and 1-2 hr lab.

5820 Traffic Engineering—Operations (3) Fixed-time and volume-density controllers; progressive systems; one-way operations; reversible flows; system operation, including computerized networks; legal aspects of operational controls. Prereq: 5810. 2 hrs and 1-2 hr lab.

5840 Geometric Design (3) Advanced theory and practice in the geometric design of highways. Prereq: 4600.

5850 Functional Design of City Streets and Urban Freeways (3) Application of urban growth and development; classification and function of streets; design features, including intersections, parking, effect of mass transportation; channelization; marketing; lighting; freeway, frontage road, street system. Prereq: Consent of instructor.

5860 Urban Transportation Planning (3) Prediction of traffic demands and vehicular flows; land use planning; parking needs. Prereq: 5810.

5870 Public Transit Planning (3) Person movement by bus, rapid transit, and light rail transit. Nature of public transit; its various roles and how they fit community's needs; user preferences; modal split models; total social, political, economic and technical impacts of public transit. Prereq: 4000 or graduate standing.

5890 Traffic Accident Reconstruction (3) Proper traffic accident data collection and analysis as basis of designing accident prevention or control programs. Many contributing factors to an accident; proximate and secondary accident causes as they relate to roadway improvements. Prereq: 4640 or 5810 or consent of instructor.

5900 Special Problems in Civil Engineering (1-4) 1 to 4 credit conceptual problem requirement in the non-thus program. Enrollment limited to civil engineering students in non-thus program. Prereq: Graduate standing. May be repeated. Maximum 9 hrs. S/NC only.

5910-20-30 Special Topics (3, 3, 3) Analysis and design of certain civil engineering structures not included in other courses such as arches, long span and movable bridges, complicated trusses.

6000 Doctoral Research and Dissertation

6610 Behavior of Steel Bridges and Buildings (3) Behavior, analysis, and design of plate girders, columns and composite members subjected to static and dynamic loading. Prereq: 5710 and 5760.

6740 Behavior of Reinforced Concrete Beams and Frames (3) Ultimate strength and behavior of statically indeterminate reinforced concrete structures; analysis of elastic and inelastic behavior or framed structures; limit analysis. Prereq: 5120 and 5740.

6750 Behavior of Reinforced Concrete Slabs (3) Behavior, analysis and design of reinforced concrete slabs; finite element solutions; ACI Code methods; yield-line theory. Prereq: 5740, 5160 or Engineering Science and Mechanics 6310.

6830 Traffic Flow Theory (3) Queuing theory, Markov processes, Monte Carlo methods, simulations of various conditions and/or designs. Prereq: 5450 or Mathematics 3150, 5820.

6880 Statewide Passenger Transportation Planning (3) Continuation of comprehensive design project; introduction to transportation plan, intercity traffic models, functional classification, programming and scheduling. Emphasis on government policy decisions, how they affect air and highway investments. Prereq: 5860.

6870 Future Transit Technology and Research (3) New transit systems and new technology; identification of possible new transit technology and planning process and possible research designs. Prereq: 5870.


8110-20-30 Special Topics in Civil Engineering (3, 3, 3) Special topics and consent of interest in civil engineering. Prereq: Consent of instructor.

NOTE: Not all of the above courses will be offered in any one year.

Environmental Engineering

3000 Introduction to Environmental Engineering (3) Introduction to human interaction with the air, water, and land environment in which one lives; role of engineering in environmental control.


4150 Urban Water Management (3) Introduction to urban water modeling; evaluation of optimum urban water policies; formulation of system constraints and analysis of decision-making process; management of storm water for beneficial use. Prereq: 3000 and 3330.

4210 Water Resources Engineering Design (3) Elements of water resource structures and systems, including reservoirs, dams, control works, and open channel design. Dam safety control, environmental impact and reservoir projects. Prereq: 3330 or consent of instructor.

4220 Water Resources Engineering Development (3) Multidisciplinary evaluation procedures for comparing and selecting among water resources development alternatives; achieving project optimality; single- and multiple-purpose projects; special topics in development in water resources engineering. Prereq: 3330 or consent of instructor.

4330 Hydrologic Design (3) Application of frequency and regression analysis to hydrologic design of water resources systems; unstable surface runoff and streamflow modeling; urban peak runoff design using kinematic wave theory; evaluation of effects of land use changes on streamflow quantity and quality. Prereq: 3330.

4510 Elements of Water and Wastewater Treatment Systems (3) Introduction to theory and design of water and wastewater treatment systems and wastewater collection systems. Prereq: 3000, 3310 and 3330.

5420 Elements of Water and Wastewater Treatment Systems Design (3) Introduction to unit operations and processes employed in physical, chemical, and biological treatment of water and wastewater. Application of unit operations and processes used in water and wastewater systems to actual operating situations and regulatory requirements. Prereq: 4510, 5410.
5251 Stormwater Modeling I (3) Interpretation of hydrologic data using methods of systems analysis. Hydrologic components are analyzed as linear and non-linear equations, and incorporated into mathematical models of watershed response. Optimization modeling parameters with illustrative examples. Prereq: Consent of instructor.

5302 Stormwater Modeling II (3) Continuous simulation techniques: implemented using methods of stochastic hydrology, including flow frequency and time series analysis. Hydrologic design of water systems using streamflow simulation techniques including autoregressive and fractional gaussian noise models. Prereq: Consent of instructor.

5210 Groundwater Transport Processes (3) Dynamics of flow in porous media with emphasis on physical processes important in subsurface hydrology, and anisotropy, layered soils, and unsaturated flow phenomena. Analytical solutions of flow equations, Dupuit approximations, and numerical methods. Hele-Shaw, and graphical solutions. Prereq: Engineering Science and Mechanics 5110 or consent of instructor.

5330 Descriptive Hydrology (3) Occurrence and description of elements of hydrologic cycle, effects on earth and relation to man. Not for civil engineering majors. (Same as Water Resources Development 5330.)

5400 Introduction to Environmental Systems (3) Models of air and water quality, water resources, solid waste disposal, and location of central facilities: exposure to current literature on environmental management problems; optimization of these systems. Prereq: Civil Engineering 4890 or consent of instructor.

5501 Water and Wastewater Treatment Theory I (3) Theory of unit operations employed in sanitary engineering. Prereq: 4520.

5502 Water and Wastewater Treatment Theory II (3) Theoretical, operational, and biological processes employed in sanitary engineering. Prereq: 5501.


5530 Environmental Engineering and Natural System Behavior (3) Relationship between environmental engineering and natural system behavior, incorporating the principles of eutrophication and limiting nutrient concept in relation to research and translation into law and wastewater engineering practice. Seminar-open discussion format. Prereq: Graduate standing or consent of instructor.

5551 Water Quality Management (3) Water quality control objectives, methods, and philosophies; water quality criteria; effect of various uses on water quality. Prereq: Consent of instructor.

5561 Environmental Management of Water Quality (5) Water quality management and concepts of quality as a dimension of water; effects of agricultural, domestic, and industrial use upon water quality; legal and administrative aspects of water quality control; management of water quality via nonstructural as well as biological, physical/chemical and advanced treatment processes. Prereq: 3000 or equivalent.

5582 Microbiology for Sanitary Engineers (3) Microorganisms and their interactions with water, sewage, and wastewater. Application of modern instrumental procedures for physical, chemical, and biological analysis. Prereq: 4530. 3 labs.

5600 Solid Wastes (3) Magnitude and characteristics of solid waste problem; methods for collection and disposal of solid wastes, including sanitary landfill, incineration, composting, and proposed new technologies, and recycling. Prereq: Graduate engineering major or consent of instructor.

5610 Solid Waste Disposal (3) Problems in the areas of landfill design and costing, incinerator design and costing, and special topical areas. Prereq: 5600.


5700 Planning and Air Pollution Control (3) Relationship between air pollution, area development, and urban growth, social, economic, and political processes involved in air pollution control.

5710 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air monitoring, dispersion of pollutants. Prereq: 4700 and Engineering Science and Mechanics 3110.

5720 Air Pollution Particle Collection Theory (3) Theory of particulate, and aerosol collection in gas medium including particle motion, coagulation, and aerodynamic capture of particles. Prereq: 4700 and Engineering Science and Mechanics 3110.

5725 Air Quality Modeling and Impact Assessment (3) Techniques to assess the air quality impact of major transportation projects and industrial air pollution sources. Application of atmospheric dispersion models and evaluation of meteorological and air quality data. Prereq: Graduate standing. (Same as Civil Engineering 5725.)

5730 Air Pollution Control Device Design (3) Design and evaluation of systems used to control emission of gaseous and particle air pollutants comprehensively for a specific device and systems. Prereq: 5720.

5735 Industrial Source Sampling (3) Sampling methods for gaseous and particulate air pollutant emissions from industrial processes. Prereq: Graduate standing, 2 hrs and 1 lab.

5740 Dynamical and Physical Meteorology (3) Physical principles of the atmosphere sciences. Atmospheric energetics, general circulation, perturbation theory, vorticity equation, the equation of motion, solar and terrestrial radiation, thermodynamics of dry and moist air. Prereq: Mathematics 4550 and Engineering Science and Mechanics 3110 or equivalent.

5750 Turbulence in the Atmosphere (3) Theoretical boundary layer mean wind and temperature profiles derived and related to observations. Estimating surface fluxes, effect of turbulence, and crospectra. How theories can be applied to atmospheric turbulence in air flow over urban areas. Mechanisms of formation of clear air turbulence in shear zones in free atmosphere.

5760 Diffusion in the Atmosphere (3) Movement and dilution of natural or man-made material released into the atmosphere. Basic theory. Rise of buoyant plumes, relation between Eulerian and Lagrangian spectra, differences between
Electrical Engineering

MAJOR: DEGREES

Electrical Engineering

M.S., M.E., Ph.D.

Professors:

J. M. Googe (Head), Ph.D. Georgia Institute of Technology; F. E. Bailey, Ph.D. Auburn University; D. R. Johnson, Ph.D. Auburn University; J. D. Birdwell, Ph.D. Purdue University; D. Tillman, Ph.D. Georgia Institute of Technology; W. M. Scull (Emeritus), M.S. Columbia, P.E.; E. L. Hall, Ph.D. Missouri; H. M. Scull (Emeritus), M.S. Columbia, P.E.; F. W. Symonds, Ph.D. Nottingham (UK).

Distinguished Service Professor:

D. Rosenberg, Ph.D. Missouri; (Emeritus), M.S. Columbia, P.E.

Associate Professors:


Assistant Professors:

A. O. Bishop, Ph.D. Georgia Institute of Technology; R. M. O'Kane, Ph.D. Auburn University; D. J. Coates, Ph.D. Auburn University; T. V. Blalock, Ph.D. Tennessee; J. D. Birdwell, Ph.D. Purdue University; D. Tillman, Ph.D. Georgia Institute of Technology; W. R. Rochelle, Ph.D. Maryland; V. M. Shofer, Ph.D. Tennessee; B. Smith, M.S. Illinois; D. J. Tilmann, Ph.D. Auburn; C. H. Weaver, Ph.D. Wisconsin; J. J. Googe (Emeritus), M.S. Tennessee; H. M. Scull (Emeritus), M.S. Columbia, P.E.; F. W. Symonds, Ph.D. Nottingham (UK).

The Ph.D. degree with a major in Electrical Engineering may be pursued in the areas of circuit theory, computers, electro-optics, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, and control systems.

Specific departmental requirements for the Ph.D. degree:

1. A minimum of 72 quarter hours of course work excluding thesis, research, and dissertation credit.

2. A minimum of 36 quarter hours credit in doctoral dissertation.

3. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's area of study.

4. Satisfactory performance on both a written and an oral preliminary examination.

5. Participation in departmental seminars.

The 72 quarter hours of course work must satisfy the following requirements:

a. A minimum of 36 quarter hours of work in electrical engineering at the 5000 and 6000 levels.

b. A minimum of 12 quarter hours of 6000-level course work. At least 3 quarter hours of this work must be in an area other than the student's major area.

The Ph.D. degree includes 18 quarter hours of mathematics at the 4000-level or above. This requirement is usually fulfilled through courses required in the electrical engineering undergraduate curriculum.

Courses required in the electrical engineering undergraduate curriculum cannot be used in either the M.S. or Ph.D. programs. In addition, 4000-level courses in electrical engineering may not be used if 6000-level courses are available in the same area.

Many of the electrical engineering courses are offered in the evening. Students working in industry are encouraged to participate in the department's graduate program.

The departmental graduate programs providing special opportunities for academic and research work in areas pertinent to atmospheric and aerospace flight are also available at the Space Institute, Tullahoma.

3010 Transient Analysis (3) Analysis of transient response of networks and systems. Laplace transform method and classical differential equation methods for system analysis; complex frequency concept and pole-zero concepts; applications to engineering problems. Prereq: 2030.


3050 Basic Field Theory (3) Forces between charges, electric and magnetic fields, Gauss's law and divergence, potential and line integrals, material bodies, polarization, magnetic circuits. Maxwell's equations, dynamic potentials. Prereq: Mathematics 2860.

3060 Propagation I (3) Plane waves, reflection, guided waves, transmission lines, standing waves, impedance, impedance matching, graphical methods, rectangular wave guides. Prereq: 3050. 3 hrs including biweekly lab.

3080 Energy Conversion (3) Magnetic circuits, transformer theory and operation, principles of electromechanical energy conversion with emphasis on input-output characteristics; steady-state
state analysis of induction motors and d.c. machines. Prereq: 3040. Includes biweekly lab.

3060 Energy System Operation (3) Synchronous machines, transmission-lines, and transformers as power system elements; power system representation, simulation, network, and fault studies. Prereq: 3060. Includes biweekly lab.


3110 Basic Electrical Engineering—Circuits and Fields (3) For non-electrical engineering majors. Prereq: Mathematics 2850, Physics 2310-30. 3 hrs including biweekly lab.

3120 Basic Electrical Engineering—Electronics (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3130 Basic Electrical Engineering—Machine (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3140 Logic Design of Digital Systems (3) Introduction to boolean algebra and design of combinational circuits. Presents gate and flip-flop characteristics. Design of clocked sequential circuits and other systems containing memory, introduction to microcomputer architecture, and system components to include basic structure and function of arithmetic, storage, input-output, and control system set as well as machine and machine language programming. Prereq: 3010, Computer Science 3150. 3 hrs including biweekly lab.

3190 Plasma I (3) Engineering applications of plasma, plasma effects and devices. Topics include electrostatic precipitators and plasma light sources, laser operation and applications (electro-optics), and MHD controlled thermonuclear and other techniques of advanced power production. Prereq: Physics 2310-20. 3 hrs including biweekly lab.

3720 Linear Systems Analysis (3) Steady-state and transient response; log-frequency, gain-phase, and polar plots; block diagram transformation; signal flow graphs; analog computer, systems, properties of second order systems; introduction to feedback theory; stability criteria. Prereq: 3095, 3150, 3170. Coreq: 3180. 3 hrs including occasional labs.

3810 Electronics I—Basic Electronic Processes (3) Current conduction in semiconductors and high voltage thyristors and other devices, characteristics of diodes; rectifiers and diode switches. Prereq: 3040 concurrently. 3 hrs including biweekly lab.

3820 Electronics II—Basic Electronic Devices (3) Characteristics and equivalent circuits of vacuum tubes and transistors with application to amplifier and control circuits. Prereq: 3810. 3 hrs including biweekly lab.

3830 Electronics III—Basic Electronic Amplifiers (3) Vacuum tube and transistor RC coupled amplifiers; tuned amplifiers; basic power amplifiers; bias stability, feedback. Prereq: 3010 and 3820. Coreq: 3720. 3 hrs including biweekly lab.

4020 Direct Electrical Energy Conversion (3) Basic principles, typical devices and applications for production of electrical energy by thermonic effects, thermionic conversion, magnetohydrodynamics, solar cells, and fuel cells. Laboratory demonstrations. Prereq: 3660, 3810 and 3810.

4080 Microwave Circuits and Electronics (3) Circuits represented by wave scattering, isolators, gyrors, couplers, magneto vacuum diodes, hetroelectric elements, resonant circuits, crossfield devices, parametric amplifiers, power generator semiconductor circuits, varactor semiconductors. Prereq: 3660. 3 hrs including biweekly lab.

4090 Propagation II (3) Metal tube, dielectric rod, and stripline waveguides. Waveguide resonators and other loading components. Design of structures utilized for microwave power transmission and for microwave integrated circuits. Prereq: 3060. 4 hrs.


4730 Introduction to Feedback System Design (3) Mathematical formulation of control systems; steady-state error and error constants; root-locus method; optimum gain adjustments; compensation networks. Prereq: 3070. 3 hrs including biweekly lab.

4740 Power System Components and Control (3) Analysis of power system components and their interconnection. Studies in control of power and frequency as well as voltage and reactive power. Prereq: 3090.

4720 Power Systems Analysis (3) System studies including load flow, faults, and stability. Prereq: 3090.


4770 Plasma II (3) Magneto hydrodynamics. Prereq: 3190.


4800 Electro-optic Detection and Instrumenta- tion (3) Sensitivity, resolution (frequency response) and other practical considerations, engineering data for both spatial recording media (e.g. photographic emulsions) and temporal detectors (e.g. photodiodes) will be given. This last third of the course will be devoted to selected electro-optic instrumentation systems (e.g. laser light scattering, optical data processing, holographic interferometry).


4570 Electromagnetism I (3) Reproduction of monochromatic and stereophonic sound, micro- phones, loud speakers, disc recording, magnetic recording, film recording; acoustics of studios, auditoriums.

4600 Instrumentation Transducers and Signal Conditioning Electronics (3) Various sensors and transducers utilized for parameter measurement. Use of the operational amplifier in signal condition- ing; design examples such as active filters, amplifiers, attenuators, and function generators. Analysis of interfacing problems between transi- er and signal-conditioner. Applications to environments monitoring instrumentation. Prereq: 3120 or 3830.

4610 Analog-Digital Systems (3) Principles of analog computing components. Applied to ana- log computing to include problem set-up and solution characteristics, operational amplifiers, voltage followers, and function generators are developed. Presents comparators, digital to analog conversion, and analog to digital conversions. Prereq: 3180 and 3830. 3 hrs including biweekly lab.


4650 Biomedical Instrumentation (3) Nature and origin of bioelectric potentials, transducers, analog and digital recordings, recording systems and noise problems.

4680 Electronic Power Amplifiers (3) Transistor and vacuum-tube power amplifiers; distortion, thermal considerations; r.f. power amplifiers; oscillators. Prereq: 3350. 3 hrs including biweekly lab.

4690 Communications Electronics (3) Oscillators, modulation and demodulation; basic communica- tions systems. Prereq: 3350. 3 hrs including biweekly lab.

4700 Switching Circuits (3) Pulse amplification, gating circuits, multivibrators, wave shaping cir- cuits, trigger circuits. Prereq: 3010, 3830. 3 hrs including biweekly lab.

4740 Impedance Transformers (3) Processing and fabri- cation of active and passive components for monolithic and hybrid circuits. Design of linear and digital and large scale integration. Prereq: 3620.


4800 Hardware-Software Interface in Microcom- puter and Microprocessor System Design (3) Presents microcomputer and microprocessor interface design. Hardware-software interaction and trade-off. Priority interrupt structures are discussed and utilized. Telecommunications and other loading components. Design of control unit systems is developed. Project oriented, contract course. Completion of two projects, one utilizing a mini- computer and the other a microcomputer, are minimal course requirements. Prereq: 3180.

4810 Discrete-Data Systems (3) Introduction to analysis and design of discrete data control sys- tems including frequency domain techniques; real-time digital filtering techniques; application of digital computers in closed-loop feedback systems.

4820 Introduction to Pattern Recognition (3) Role of pattern recognition within framework of artifi- cial intelligence. Topics dealing with the design of learning and adaptive machines. Typical appli- cations of pattern recognition to problems of practical significance. Computer simulation of elementary pattern recognition problems. Pre-
3480 Digital Image Processing (3) Principal methods for coding, storing, and processing images by means of digital computers, combined algorithms for image operations. Prereq: 3100 and Computer Science 3150, or Statistics 3450 and Computer Science 1510. (Same as Computer Science 4820.)

5480 Small Computer Systems (3) Basic structure of small computer systems, input-output techniques, interrupt structures, peripheral devices, system software and assembly language programming. Course is project oriented. Prereq: Computer Science 5480 or consent of instructor. (Same as Computer Science 4850.)

4910-20-30 Special Electrical Engineering Problems (3, 3, 3) Problems in electrical engineering involving library and experimental research.

5000 Thesis

5540-50-80 Electrical Engineering Research (3, 3, 3)

5570-40 Modern Transform Methods (3, 3) La-place transform and complex variable theory. Z-transform, difference equations and distributed parameter systems.


5520 Network Synthesis and Design (3) Frequency domain and time domain synthesis of network functions; realization of one-port and two-port networks by R, L, and C elements. Approximation problem and filter design; computer aided techniques. Prereq: 5070 or equivalent.


5570 Bioengineering Systems I Models, Systems Analysis and Simulation (3) Modeling techniques applied to physiological systems. System properties of resistance, impedance, and transformers. Formation of system network formations of random variables. Random processes, stationarity, correlation functions and temporal analysis, power spectrum and spectral analysis theory; system modeling; stability analysis; system response analysis; design of estimator and observer; system compensation. Emphasis on control aspects of control systems. Coreq: 5070 or equivalent.

5510 Basic Requirements for Plasma Fusion (3) Historical study of fusion systems in nature. Lawson break-even criterion, inertial fusion systems—hydrogen and deuterium, and e-beam fusion. Magnetically-confined plasma systems, tokamak, mirror system, and exotic systems. Confinement, stability, and heating. Possibility of fusion-fission hybrids. Prereq: Consent of instructor or plasma engineering or plasma physics background or employment in fusion work.

5520 Diagnostics for Fusion (3) Hot plasma. Simple gross measurements-resistivity and diamagnetism; electron, ion, and neutral particle techniques. X-ray diagnostics. Spectroscopy and its limitations. Future possibilities. Prereq: Consent of instructor or plasma engineering or plasma physics background or employment in fusion work.


5560 Application of Quantum Electronic Devices (3) Coherence properties of laser radiation and "beat-frequency" experiments. Lasers in communication and instrumentation systems. Specific applications: examples: mall diagnostics, Raman emission spectroscopy, optical harmonic generation, holography, metal-working, and biological and medical uses. Prereq: 5340 and Mathematics 4710 or equivalent.

5570 Advanced Direct Electrical Energy Conversion I (3) Theory, latest devices, and engineer- ing applications for production of electrical energy by solid state methods. Prereq: 4020 or Mechanical Engineering 4150 or equivalent, or consent of instructor.

5580 Advanced Direct Electrical Energy Conversion II (3) Theory, latest devices, and engineer- ing applications for production of electrical energy by gaseous means of thermionic, magnetohydrodynamic, and electrodynamic devices. Prereq: 4020 or Mechanical Engineering 4150 or equivalent, or consent of instructor.

5590 Advanced Direct Electrical Energy Conversion III (3) Theory, latest devices, and engineer- ing applications for production of electrical energy by gaseous means of thermionic, magnetohydrodynamic, and electrodynamic devices. Prereq: 4020 or Mechanical Engineering 4150 or equivalent, or consent of instructor.

5600 Power System Networks (3) Sequence impedances for transmission lines, machines, and transformers. Formation of the network characteristic matrix, and methods of solution. Computer methods. Prereq: Graduate standing or consent of instructor.

5620 Fault and Load Flow Studies (3) Analysis of power systems under transient and steady fault conditions. Computer methods for fault studies. Load flow problem is formulated with computer programs. Prereq: 5410 or consent of instructor.


5440 Distribution Systems (3) Electric power dis- tribution with particular reference to utility sys- tems. Network diagram generation and analysis. Prereq: 4410, 4425, 4430 or equivalent.

5460 Selected Topics in Power Systems (3) To meet special needs of students. Possible topics: power systems reliability, interconnected sys- tem theory, power plant operation, electrical transients in power systems, and power system control. Prereq: Consent of instructor. May be repeated with consent of department.


5540 Thick-Film Hybrid Microcircuits (3) Processing and basic design techniques for prototype production of hybrid thick-film integrated circuits from circuit design through packaging. Properties of thick-film pastes; cost-effective design techniques. Project oriented, includes basic circuit design.

5570-80-90 Electronic Switching Circuits (3, 3, 3) Switching circuits using active devices; clipping circuits, clamping circuits, comparator circuits, logic gates, and flip-flops. Low and high-level circuits, time-base generators, blocking oscillators, gates, counting and timing circuits, syn- chronous and asynchronous circuits, division, shift operations. Prereq: Consent of instructor. Coreq: Mathematics 4510 or 4710.


5650-60 Electronic Communication Systems (3, 3) Information transmission in communications systems; mathematical treatment of modulation and demodulation in analog and pulse-type systems. Bandwidth requirements, noise, system performance in non-carrier systems, and emphasis on digital data systems. Prereq: 5710.

5670-80 Pattern Recognition (3, 3) (Same as Com- puter Science 5860-50.)

5690 Artificial Intelligence (3) (Same as Com- puter Science 5210.)

5710 Random Process Theory for Engineers (3) Probability and random variables as approaches by signal theory. Statistical averages and transforma- tions of random variables. Random proc- esses, stationarity, correlation functions and temporal analysis, power spectrum and spectral
analysis as applied to response of systems to random inputs.  

5740 Digital Processing of Signals (3) Analysis of discrete signals; sampling theorem and its implications; frequency-domain analysis of digital filters; time-domain design of digital filters; quantization; efficient processing of digital signals; discrete Fourier transform. Prereq: 4100 or equivalent.


5770 System Identification (3) Various identification schemes; deterministic, stochastic, and hierarchical methods. Applications in all areas of engineering and science. Prereq: Consent of instructor.

5800 Power Transmission Lines (3) New and unconventional power transmission systems. Transmission line parameters for overhead and underground lines, and radio interference of high voltage transmission. Insulation coordination and protection. Design procedures for electromagnetic transmission. Prereq: 4410-20 or equivalent.

5810-20 Electromagnetic Fields (3, 3) Vector analysis, Maxwell's equations, special relativity, plane and spherical waves in anisotropic media, guided waves, rectangular and cylindrical wave guides, radiation from current elements. Coreq: Mathematics 5610.

5820 Linear Antennas and Antenna Arrays (3) Hertzian dipole, linear antennas, impedance loop antennas, receiving antennas, linear arrays. Prereq: 5820.


5850 Microwave Electronics (3) Space charge waves on electron beams, coupling between beams and guided waves, Knuckles, magnetrons, traveling wave amplifiers and backward wave oscillators. Prereq: 5820.

5860 Electromagnetic Wave Propagation (3) Wave propagation in isotropic and anisotropic media, transmitted power, stored energies, propagating and nonpropagating modes, orthogonality properties. Radiating and radiation conditions. Prereq: 5820.

5870 Introductory Microwave Networks (3) Circuit equivalents for n-port, junctions, obstacles, loading and filaments, one way and two way devices, directional devices, parameter measurements, reflection charts. Prereq: 5810. Coreq: Mathematics 4510 or 4710.

5940-50 Advanced Small Computer Systems (3, 3) Real-time applications, memory and CPU organization, interface software, and peripheral devices. Design of minicomputer and microprocessor system are studied. Project-oriented, supported by hardware and software interface design. Prereq: 5940 or Consent of instructor. (Same as Computer Science 5940-50.)

6000 Doctoral Research and Dissertation

6240 Advanced Systems Theory (3) Advanced analytical methods for systems with deterministic inputs; treatment of discrete-data, nonstationary and nonlinear systems. Prereq: 5910 or equivalent.

6250 Stochastic Processes in Engineering Systems (3) Analysis and design of systems with stochastic inputs. Methods of batch and sequential estimation; time domain and frequency domain methods of optimum filter design. Prereq: 5730 or equivalent.

6280 Modern Control System Design (3) Design of optimum control systems via variational calculus, maximum principles, dynamic programming, and gradient methods. Prereq: 5240-50 or equivalent.

6270-80 Special Topics in Control Systems Theory (3, 3) Advanced problems, new developments in control literature. Prereq: 5240-50-60 and consent of instructor.


6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) (Same as Physics 6500-10.)


6760 Coding Theory (3) Mathematical structure of algebraic and probabilistic codes. Coding metrics and bounds, linear codes, linear feedback shift registers, convolutional codes, burst-error-correcting codes and decoding methods. Prereq: 5710 or consent of instructor.


NOTE: Not all of the above courses will be offered in any one year.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy with a major in Engineering Science are available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. Program options include solid mechanics, fluid mechanics and biomedical engineering. In the biomedical and engineering science option, interdisciplinary programs are arranged to meet individual needs or interests. Each applicant will be advised as to any prerequisite courses before entering a program; the student's program of study must be approved by his/her advisory committee, and must comply with the requirements of the Graduate School. The student's major professor may be selected from a department other than the Department of Engineering Science and Mechanics. A departmental application is required in addition to the Graduate School application. The names and addresses of four references must be included with the departmental application.

The flexibility and interdisciplinary aspects of the program options are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering, or can best be met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics, or in related interdisciplinary studies such as biomechanics.

THE MASTER'S PROGRAM

Two M.S. plans are offered: Plan I requires a thesis, while Plan II does not. The second plan is offered to meet the
needs of engineers employed in industry, or those who plan to teach in community colleges and technical institutes. It will be available, however, to any student who, in the opinion of his/her advisory committee, can benefit from additional course work more than from work on a thesis. In Plan I a minimum of 45 quarter hours, including the thesis, is required. In Plan II a minimum of 48 hours is required. The requirements include the following:

<table>
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<th>HOURS CREDIT</th>
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<tr>
<td>Plan I Plan II</td>
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<tr>
<td>Mathematics Engineering courses (Major option; may include but is not restricted to courses offered by the Engineering Science and Mechanics Department.) Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses.)</td>
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6. Preliminary examination consisting of a written qualifying examination and an advanced examination. The qualifying examination covers areas of engineering science and mathematics, for the most part on a graduate run level and scope expected of well-qualified recipients of a Bachelor's degree in engineering. The advanced examination requires demonstration of special competence in the areas of concentration selected by each student under item 2.

7. Submission of a written proposal for dissertation research to the student's advisory committee. Oral defense of the proposal is normally required when the student takes the advanced portion of the preliminary examination.

8. Submission of a dissertation which meets the requirements of the Graduate School, the department, and the student's advisory committee.

3311 Mechanics of Materials (4) Concepts of stress and strain; stress-strain relations and Mohr's circle; analysis of members at rest; moment of inertia; stress and displacement analysis of axially-loaded members; torsion; bending. Not for departmental graduate credit. Prereq: Basic Engineering 1300. Coreq: Mathematics 2850.

3410 Introduction to Biomedical Engineering (4) Designed to facilitate and opportunities of biomedical engineering, and to provide basic terminology and background knowledge for further courses in the field. Subjects include anatomy, physiology, biomaterials, mathematical models of body systems. Coreq: Mathematics 2840 or consent of instructor.

3420 Introduction to Clinical Engineering (3) Designed to facilitate an understanding of life sciences, the needs of life science professions, and engineering in use and applications of medical instruments. Body systems are introduced, and instruments used in care of these systems are explained and demonstrated. Prereq: 3410 or consent of instructor.

3430 Perspectives on Medical Ceramics (3) Discusses basic terminology and background knowledge for the study of medical ceramics, and to provide a broad overview of the field of medical ceramics. Coreq: Mathematics 2840 or consent of instructor.

3520 Materials Behavior and Chemical Process Equipment Design (3) (Same as Metallurgical Engineering 3520.)

3700 Dynamics (4) Kinematics of rigid bodies; mass moments of inertia; coulomb friction; kinetic energy of rigid bodies using force, mass, acceleration; work-energy; impulse-momentum. Not for departmental graduate credit. Prereq: 2705 or Basic Engineering 1320, Mathematics 2840.

3710 Intermediate Dynamics (3) Three-dimensional dynamics of particles and rigid bodies; dynamics of flyer plates; central force motion; LaGrange's equations. Prereq: 3700, Mathematics 2850.

4420 Engineering Aspects of Infection Control (3) Biomedical engineer's role in infection control will be related to hospital and clinical activities. Fluid flow phenomenon, pressure measurement techniques, and analysis of chemical and biological and medical tests will be demonstrated. Course identifies new and critical role for biomedical engineer in hospital care systems, and includes analysis of hospital facilities and monitoring systems. Prereq: 3410 or consent of instructor.

4430 Orthopaedic Biomechanics (3) Introduction to engineering principles and applications in orthopedics and rehabilitation. Topics include statics, Newton's laws of motion, stresses in simple sections, engineering materials, and biological materials. Prereq: Consent of instructor.

4500 Applied Mechanics for Life Scientists (4) Concise and broad coverage of basic principles and concepts of mechanics. Fundamental concepts, statics, vibrations, continuum mechanics and properties of materials. Applications in engineering and medicine. Prereq: Mathematics 1860 or consent of instructor.

4520 Biomedical Fluid Mechanics (3) Discusses objectives, review foundations and present developments in biomedical fluid mechanics, properties of human blood and blood vessels, determinants of cardiac performance, analysis and measurement of flow and pressure in arteries, noninvasive study of circulatory system, mechanics of microcirculation. Applications to areas of biomedical engineering. Prereq: 4500 or a course in fluid mechanics or consent of instructor.

4529 Biomedical Fluid Mechanics Laboratory (2) Measurement and recording of flow characteristics in biological systems. Project and/or term paper required. Coreq: 4520.

4530 Biomechanics (3) Discuss objectives, review foundations and present developments in areas of biomechanics of living tissues, biomechanics of injury and prosthesis, material compatibility of prosthetics, and fluid mechanics of blood vessels. Prereq: 4500 or consent of instructor.

4540 Fracture-Safe Design (3) A critical review of mechanical properties of materials that are indicative of fracture resistance, including transition temperature, R-curves, stress intensity factors, and J-integrals; the use of these properties in design. Prereq: 3310 and Metallurgical Engineering 2110. (Same as Metallurgical Engineering 4540) 3 hrs, or 2 hrs and a 3-hr lab.

4610 Experimental Stress Analysis (3) Basic concepts: theory, techniques, and instrumentation of resistance strain gages; theory and techniques of applied strain, other stress analysis methods. Prereq: 3310, Electrical Engineering 2030 or 3110. 2 hrs and a 3-hr lab.

4620 Dynamic Data Acquisition (4) Instrumentation of measuring systems for dynamic events and responses; signal conditioning; oscilloscopes, oscillographs, and magnetic tape recording; telemetry and data transmission; and data processing. Prereq: 3311, 3700, Electrical Engineering 3120. 3 hrs and a 3-hr lab.

4630 Introductory Photonics (3) Introduces the field of photonics, including basic concepts of optical fiber and waveguide method, Moire interferometry, and holography. Prereq: 3310, Physics 2320. 2 hrs and a 3-hr lab.

4710 Fundamentals of Vibrations (3) Free and forced vibrations of simple and undamped mechanical systems; energy methods. Prereq: 2720, Mathematics 2850.


4810-20 Engineering Analysis (4,3) Integration of fundamental physical laws and mathematical methods of analysis with emphasis on applications to real-life engineering problems. Prereq: 3110, 3311, and Mathematics 3150.

4850 Elementary Structural Matrix Methods (Same as Civil Engineering 4850 and Architecture 4850.)

4910 Special Engineering Science Topics (3) Problems related to recent developments and practice. Open to juniors or seniors with consent of instructor. May be repeated. Maximum 6 hrs.

5000 Thesis
 Required for the non-thesis student not otherwise required. May be repeated with consent of department.

45-hour program is open to graduates of other engineering curricula in industrial engineering or to graduates of other engineering curricula in industrial engineering or to graduate work in Industrial Engineering and Computer Science, Statistics or Mathematics, Psychology, Business, Computer Science, Statistics or Economics.

5640 Nonlinear Viscoelasticity (3) (Same as Polytechnic Institute of Technology, P.E.; L. H. Loveless, M.S. North Carolina State, P.E.)

5110 Advanced Fluid Mechanics (3) Advanced fluid mechanics using finite element techniques. Basic methodology; initial-value techniques; matrix interaction and convergence problems; laminar and turbulent boundary layer flow; incompressible viscous flows with separation and recirculation. Prereq: 5110 and 5860.

5140 Finite Element Methods in Fluid Mechanics (3) Computational fluid mechanics using finite element techniques. Basic methodology; initial-value techniques; matrix interaction and convergence problems; laminar and turbulent boundary layer flow; incompressible viscous flows with separation and recirculation. Prereq: 5110 and 5860.

5180 Finite Element Structural Analysis (3) (Same as Civil Engineering 5180.)

5220 Mechanics of Viscous Flow (3) Viscous forces act on a viscoelastic filament; application of Navier-Stokes equations; numerical methods of solution; stress-optic methods of laminar flow analysis. Prereq: 5110 and 5860. (Same as Chemical Engineering 5810.)


5410-20 Theory of Elasticity (3, 3) Stress, strain in three dimensions; torsion and bending of prismatic bars; axisymmetric stress distribution; stress concentration; plane stress, plane strain. Prereq: 5860.

5430 Thermal Stresses (3) Conduction; thermoelastic equations; thermal stresses in beams, rings, plates, and shells; thermal buckling and convergence phenomena. Prereq: 5410 or 5310-20, 30, and 5860. (Same as Mechanical Engineering 3440.)

5440 Theory of Linear Viscoelasticity (3) Linear viscoelasticity of solids; quasistatic problems; vibration; constitutive equations; stability problems; foundations of three-dimensional linear viscoelasticity. Prereq: 5600.

5550 Fracture Mechanics (3) Equilibrium cracks and interfaces; fracture mechanics; crack propagation. Prereq: Mathematics 4550. (Same as Civil Engineering 5180.)

5560-40 Photoelasticity (3) Physical optics, wave motion, polarized light, basic principles of photoelasticity, equipment and techniques, application to two-dimensional elasticity and stress concentration, and to practical problems in photoelastic stress analysis, photoelastic coating methods, three-dimensional photoelasticity. Prereq: 5311, Materials Science and Engineering 461, and consent of instructor. Prereq: 5860; 2 hrs and 3 labs.

5570 Advanced Dynamics (3, 3) Physical laws relative to translating and rotating reference frames; equations of motion; Lagrange's equations; Hamilton's principle. Prereq: 3710 or 4710, Mathematics 4610.

5580 Introduction to Continuum Mechanics (3) Fundamentals of mechanics of solids and fluids; Cartesian tensors; stress, deformation, and flow in continuous media; constitutive equations; applications to solids and fluids. Prereq: 3310 and 3311 or equivalents, Mathematics 4610.


5710 Perturbation Methods in Fluid Mechanics (3) General finite element procedure; convergence requirements; programming concepts. Stress closure; parabolic Navier-Stokes equations of differential equations. Prereq: 5800 or 5310, or Mechanical Engineering 5540, or consent of instructor.

5910 Special Topics in Engineering Mechanics (3) Mechanics problems related to recent developments. Prereq: Consent of instructor. May be repeated with consent of department.

6000 Doctoral Research and Dissertation

6110-20 Advanced Topics in Fluid Mechanics and Convective Transport (3) Survey of literature on advanced convective momentum, heat, and mass transfer; boundary layer theory based on the Navier-Stokes equations; boundary layer stability analysis; phenomenological theories of turbulence; turbulent boundary layer flow; high flow of compressible and reacting systems. Prereq: 5110-20, 30 or equivalent; Mathematics 4610, 4540-50, 4710. (Same as Environmental Engineering 6110-20 and Mechanical Engineering 6110-20.)


6230-45-50 Theory of Turbulence (3, 3, 3) Mathematical description of turbulence; isotropic turbulence; Kolmogorov's hypothesis; large and small eddy structure by turbulent flows; turbulent diffusion by continuous movement; applications to oceanography, wakes, pipe flow, and boundary layers. Prereq: 5110-20, 30, and consent of instructor. Coreq: Mathematics 5610-20-30.

6310 Theory of Plates (3) Classical theory of bending of plates of various shapes; thick plates; plates of variable thickness; buckling and large deflection problems. Prereq: 5310-20, 30.

6320 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, derivation of thin shell theory, and applications of theory for structural engineer. Prereq: 6310 or Civil Engineering 5160.


6340 Theory of Plasticity (3) Yield conditions; strain hardening; general constitutive equations; plastic potential functions; convexity, extremum problems, and solutions; applicability to practical problems; finite plastic deformations; plastic strain response of rheoviscous materials. Prereq: 4510 and Mathematics 4550.

6610 Photoelasticity (3) Stress-optic law in three dimensions and index ellipsoid, rotational effects in three-dimensional photoelasticity, stress fields and stress fields, applications and solutions of three-dimensional photoelasticity, scattered light method, dynamic photoelasticity, photomechanicality, photelasticity and photoviscoelasticity, recent developments in photoelasticity. Prereq: 5410 and consent of instructor. 2 hrs and 3 labs.

6710 Impact and Stress Waves in Solids (3) Mechanical impact; wave propagation in elastic solids; impact and waves in elastic rods, beams, and plates; contact problems in impact of elastic bodies; dynamic loading in viscoelastic and plastic materials; dynamic properties and materials. Prereq: 5410, 5530.

6800 Nonlinear Viscoelasticity (3) (Same as Polymer Engineering 6210.)

6910 Energy Methods (3) Virtual work, minimum potential energy, and complementary energy; Castigliano's theorem, Hamilton's principal, and Lagrange's equations for equilibrium; examples from structures, plates and shells, buckling, vibrations, and advanced dynamics. Prereq: 5710-20 and Mathematics 5610-20-30.

6910 Special Topics in Engineering Mechanics (3) Advanced problems of interest in mechanics, worked either as group or individually. Prereq: Consent of instructor. May be repeated with consent of department.

NOTE: Not all of the above courses will be offered in any one year.

Industrial Engineering

MAJOR

DEGREES

M.S., M.E.


Assistant Professor: J. R. Buchan, M.S., Georgia Institute of Technology; W. W. Claycombe, Ph.D. Virginia Polytechnic Institute and State University, Ph.D. Georgia Institute of Technology; W. G. Sullivan, Ph.D. Georgia Institute of Technology, P.E.

Assistant Professor: E. L. Deporter, Ph.D. Virginia Polytechnic Institute; M. L. Eaton, M.S. Clarkson, P.E.; M. K. Goodman, M.S., Tennessee, P.E.

THER'S MASTER'S PROGRAM

A graduate program leading to the degree of Master of Science is open to graduates of recognized undergraduate curricula in industrial engineering or to graduates of other engineering curricula who also take up to 15 quarter hours of prerequisite course work. A non-thesis option with 45 hours of course work plus a 3-hour design project is available.

Graduate work in Industrial Engineering provides for concentrations in operations research, human factors, systems engineering, reliability, work measurement, facilities planning and engineering economy. Either one or two minors can be elected in Engineering, Mathematics, Psychology, Business, Computer Science, Statistics or Economics.

MASTER OF ENGINEERING PROGRAM

This professional degree program is intended as a culminating year in a five-year baccalaureate-master program which emphasizes engineering design and professional practice. Admission requirements include those presented above plus the requirement of a Bachelor's degree from an ECPD-accredited engineering program. This 45-quarter hour program requires 18 hours of course work in an industrial
engineering core, 9 hours of technical methods electives, 9 hours of industrial engineering design electives and a 9-hour thesis or design project.

4060 Material Requirements System Design (3) Theory and applications of forecasting, production planning, scheduling, inventory analysis, and control, and systems design and implementation. Design of the material requirements process as an integrated system. Prereq: 3510. Not available for graduate credit for industrial engineering students.

4150 Project Control with CPM and PERT (3) A study of project planning and control based primarily on “critical path” techniques, including resource allocation, time-cost trade-off algorithms, multi-project control, and computer programs. Prereq: 3430.

4160 Materials Handling (3) Analysis and planning for the overall problem of moving, packaging, storing, protecting, and receiving materials. Prereq: 3220, 4520, and Engineering Science and Mathematics 2860 and Engineering Science and Mechanics 2720. Credit not given for both 4160 and 4130.

4230 Scheduling Systems (3) Performance measures for job shop and flow shop scheduling, including both static and dynamic conditions, as well as techniques for generating production schedules. Deterministic and probabilistic dispatching conditions. Prereq: 3520.

4520 Engineering Economy (3) Methods and problems in selection or replacement of equipment, involving capital recovery, economic life of equipment, and rate of return on investment. Not available for graduate credit for industrial engineering students.

4530 Case Studies in Engineering Economy (3) Extension of basic engineering economy principles by examining case histories of companies and regulated industries. Case studies taken from literature form basis of classroom discussion. Out-of-class assignment is made from literature for presentation in class. Prereq: 4520.

4540 Industrial Development (3) Factors other than mechanical or chemical which enter into successful expansion of manufacturing enterprises. Cost and location studies and market analysis to determine the commercial feasibility of new plants or projects.

4590 Simulation (3) Generation of outcome of complex random process by computer. Models of complex systems using available simulation languages. Simulation as design tool in industrial systems. Prereq: 3430 and Computer Science 3150.

4830 Health Systems Engineering (3) Hospital management systems and means by which they may be improved or replaced. Application of industrial engineering principles and techniques. Prereq: 3220.


4910-30 Special Industrial Engineering Topics (3, 3, 3) Prereq: Consent of instructor. May be repeated.

4950 Industrial Safety (3) Design and operation of systems for safe working conditions. Prereq: 3510-20. Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty before degree is completed. May not be used toward degree requirements. May be repeated. S/J/N basis.

5100 Work Design (3) Advanced methods analysis of design and improvement of work systems, human factors, workers' response and management of work design. Prereq: 4910.

5120 Advanced Work Measurement (3) Characteristic of predetermined time systems, application in formulating and planning and experience in practice. Prereq: 3600 or 3620.

5240 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout techniques, applications of operations research, and design of systems for manufacturing. Prereq: Production facilities planning or consent of instructor.


5260 Information Systems Design (3) Systems engineering, system design, system system analysis and evaluation of information systems, information objectives and decision criteria. Optimization and simulation in system design.


5360 Statistical Methods in Industrial Engineering (3) Density functions and their properties Analysis and interpretation of data collected in application of industrial engineering techniques. Prereq or coreq: Statistics 3450.

5420 Reliability Engineering (3) Reliability concepts, failure distribution, equipment reliability, time dependent and Markov dependent systems. Maintenance data analysis and replacement planning. Prereq: Statistics 3450.


5580 Human Factors Engineering (3) Human characteristics which influence design of tools, equipment, environments, and products. Modeling of human as process or system controller. Prereq: Consent of instructor.


5700 Optimization Methods in Industrial Engineering (3) Operations research, analytical techniques required in 5710, 5720, and 5730. Classical optimization methods applied to problems in production, decision structure, and simulation. Prereq: Computer Science 3150 and Mathematics 2860.
gramming, Decision making under certainty and risk. Prereq: 5710.


6910 Advanced Topics in Industrial Engineering (3) Will cover topics not covered in other graduate courses. A forum for advanced graduate students to study individually or in group as appropriate. Prereq: Graduate standing and consent of instructor. May be repeated with consent of department.

Mechanical and Aerospace Engineering

MAJORS

Aerospace Engineering M.E., M.S., Ph.D.
Mechanical Engineering M.E., M.S., Ph.D.

Profiles:
M. W. Miligan (Head), Ph.D., P.E.;
J. F. Bailey, Ph.D., Lehigh, P.E.;
A. J. Edmondson, Ph.D., Texas A. & M., P.E.;
B. H. Goethert, Ph.D., Berlin, Germany;
J. W. Hodgson, Ph.D., Georgia Institute of Technology, P.E.
W. S. Johnson, Ph.D., New Mexico State;
R. L. Maxwell, Ph.D., Case Western Reserve, P.E.;
F. H. Speckhart, Ph.D., Georgia Institute of Technology, P.E.
D. C. W. Brown, Ph.D., Northwestern, P.E.

Associate Professors:
C. W. Brown, Ph.D., North Carolina State;
R. L. Young, Ph.D., Tennessee, P.E.

Assistant Professors:
R. Arinalli, Ph.D., Virginia Polytechnic Institute;
J. A. Euler, Ph.D., Purdue, P.E.;
J. F. Bailey, Ph.D., Texas A. & M., P.E.

Graduate programs in Mechanical Engineering or Aerospace Engineering are available to the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy with concentrations in solar energy, energy conversion, pollution control, power generation, machine design and dynamics, aerosciences, stress analysis, propulsion, heat transfer, fluid mechanics, and thermodynamics. In addition to the general policies and requirements of the Graduate School, each student must satisfactorily complete a program of study which has been approved by the student's committee. Specific program requirements are given below.

MASTER OF ENGINEERING PROGRAMS

Entrance into the Master of Engineering program is restricted to qualified graduates of ECPD-accredited undergraduate curricula in mechanical or aeroengineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content.

Three program options (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER OF SCIENCE PROGRAMS

Entrance into the Master of Science programs is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites.

Three program options (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER'S PROGRAM OPTIONS

Three program options are available:
A. The Thesis Option

The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.

2. A minimum of 9 quarter hours of credit in thesis.

3. Participation in the departmental seminar programs.

4. Submission and defense of a written thesis which demonstrates the student's ability to conduct and report on an independent investigation.

5. Passing a final examination on all course work submitted for the degree.

B. The Course Option

Normally, this program is restricted to those students who have had significant engineering work experience. The evaluation of the work experience and the final selection of the student's program of study is left to the student's committee. The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 45 quarter hours of course work which includes at least 27 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics. No more than 3 quarter hours of engineering course work may be below the 5000 level.

2. Participation in the departmental seminar programs.

3. Passing a comprehensive written final examination on all course work submitted for the degree. The student's committee will be of sufficient size to include all the study areas reflected in the course program.

C. The Problems Option

The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.

2. A minimum of 36 quarter hours of credit in Selected Engineering Problems (5900).

3. A written report must be presented for each problem investigated.

4. Participation in the departmental seminar program.

5. Passing a comprehensive written final examination on all course work submitted for the degree and an oral examination on all work (including problems) submitted for the degree.

THE DOCTORAL PROGRAM

Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds. The student must satisfactorily complete an approved program of study which normally includes:

1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or problems.

2. A minimum of 36 quarter hours of credit in doctoral dissertation.

3. A minimum of 18 quarter hours in mathematics in courses numbered 4000 or above.

4. A minimum of 36 quarter hours in mechanical and/or aerospace engineering courses numbered 5000 and above, with at least 12 quarter hours of 6000-level courses. These are exclusive of thesis, problems or dissertation credit.

5. Participation in the departmental seminar program.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Junior (3000-level) and senior (4000-level) mechanical and aerospace engineering courses may be taken for graduate credit by non-mechanical or non-aerospace engineering majors, if approved by the student's major department. Mechanical or aerospace engineering majors may not normally receive more than one 4000-level engineering course to meet their advanced degree requirements. Normally, non-aerospace engineering graduate students should consult with instructors regarding prerequisites for undergraduate courses.

Mechanical Engineering

3000 Energy-An Overview (4) Introduction to available energy resources, recovery and utilization; power generation, conversion including conservation schemes; emphasis on the resources-environment-man interaction associated with energy primarily for non-engineering students.

3110 Applied Engineering Thermodynamics (3) Energy and the engineering aspects of energy transformations; thermodynamic properties; applications to engineering problems.

3311 Engineering Thermodynamics (3) Energy and its conversion, energy transformations, thermodynamic properties.

3330 Engineering Thermodynamics (3) Properties of gases and gas mixtures; chemical reactions; equilibrium; applications to mechanical engineering problems.

3410 Fluid Flow (3) Development of continuity, momentum and energy principles for fluid sys-
tems; applications to mechanical and aerospace engineering problems.

3440 Heat Transfer (3) Heat transfer processes, heat conduction, thermal radiation.

3520-30-40 Thermal Sciences (3, 3, 3) Fundamental principles of thermodynamics and transport phenomena; applications to engineering design. To be taken in sequence.

3610 Mechanics of Machinery—Kinematics (3) Machine motions, graphical and analytical methods; instantaneous centers; velocities; accelerations.

3620 Mechanics of Machinery—Dynamics (3) Applications of Newton's laws, work, energy, and impact to machinery. Force analysis of mechanisms, balancing, gyroscopic effects, flywheels. Prereq: 3610.


3950 Introduction to Machine Design (3) Ductile-brITTLE behavior of materials under static and cyclic loading. Stress concentration, design factors and theories of failure. Changes in material behavior in processing and fabrication. 2 hrs and 1-2 hr lab.

3960 Manufacturing Processes (3) Selection of processes as related to the design of machine parts. Casting, hot and cold forming, metal removal and weldments. Manufacturing tolerances and surface finishes. 2 hrs and 1-2 hr lab.

3970 Engineering Analysis (3) Advanced analysis techniques for problems of aerospace and mechanical engineering. Emphasis on approximate methods.

4140 Energy Conversion Systems (3) Laws governing energy and the transformations and their application to power plants.

4150 Energy Conversion Systems (3) Operating and design characteristics of new technology energy conversion systems, selected direct conversion techniques.

4160 Energy Conversion Systems (3) Economic and technical design parameters as applied to power plants for public utilities or industrial applications; selected design and layout problems.

4170 Turbo-Machinery (3) Basic principles of turbomachinery; systematic methods or analysis, design, performance evaluation.

4180 Energy Production and Utilization (3) Thermodynamic constraints on energy production processes; selected generation methods; evaluation of new energy sources and concepts; energy conservation schemes.

4220 Environmental Noise (3) Basic principles of acoustics—measurement and control of noise in industrial and community environments.

4242 Heat Transfer (3) Heat transfer by free and forced convection, heat transfer in phase change, heat transfer in high speed flow, heat exchanger applications.

4460 Lubrication (3) Hydrodynamic theory of lubrication of sliding bearings; application of Navier-Stokes equations to infinite and finite bearings; analytical and numerical solutions; applications to design.

4471-91 Experimental Mechanical Engineering (3, 3) Experimental methods and measurements of force, length, time, temperature, pressure, transport rate, physical properties, and analog computer solutions. Not for departmental graduate credit.

4520-39 Creative Design (3, 3) Application of engineering principles to the solution of current problems with emphasis on design innovation.

4621 Manufacturing Processes (3) Comparison of machining methods; plastic production; metrol-...
6430 Selected Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approach; equilibrium of pure substance; metastable states. Prereq: Consent of instructor.

6430 Selected Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approach; equilibrium of pure substance; metastable states. Prereq: Consent of instructor.

5120 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; hot wire anemometry and turbulence measurements, flow visualization, wind tunnel tests, and streamline experiments; boundary-layer measurements. Prereq: 4220 or Mechanical Engineering 5110, Mathematics 4250.

5120 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; hot wire anemometry and turbulence measurements, flow visualization, wind tunnel tests, and streamline experiments; boundary-layer measurements. Prereq: 4220 or Mechanical Engineering 5110, Mathematics 4250.

5000 Thesis-Non-Thesis Graduation Completion (3-15) Experimental methods and measurements of transport rates and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications. 5000 Thesis-Non-Thesis Graduation Completion (3-15) Experimental methods and measurements of transport rates and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.

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5000 Thesis-Non-Thesis Graduation Completion (3-15) Experimental methods and measurements of transport rates and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.

5000 Thesis-Non-Thesis Graduation Completion (3-15) Experimental methods and measurements of transport rates and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.
5950 Seminars (1) All phases of aerospace engineering, including reports on current research at the Aeronautical Research Center of Tennessee, Knoxville. May be repeated. S/N/Only.

5990 Special Topics in Aerospace Engineering (3) Credit to be arranged; 3 hrs maximum each quarter.

6000 Doctoral Research and Dissertation


6320 Magnetohydrodynamics II (3) Continuum magnetohydrodynamic equations. Alfven and shock waves, exact solutions for magnetohydrodynamic channel flows, one-dimensional model of channel flow, magnetohydrodynamic boundary layer. Prereq: 5310, Mathematics 5620.

6330 Magnetohydrodynamics III (3) Engineering applications of magnetohydrodynamics, propulsion and power generation. Prereq: 5320, Mathematics 5630.

6410 Physical Gasdynamics (3) High-speed, high temperature flow of gas from molecular point of view; molecular concepts and simple kinetic theory; equilibrium properties of gases and gas mixtures; fundamentals of kinetic theory; heat, thermodynamics, and statistical mechanics. Prereq: 5220 and Mechanical Engineering 5220.

6420 Physical Gasdynamics (3) Continuation of 6410. Mixtures in local thermodynamic and chemical equilibrium; physical and chemical basis of rate equations; flow with vibrational and chemical nonequilibrium. Prereq: 6410.

6510-20-30 Advanced Aerodynamics (3, 3, 3) Subsonic, transonic, supersonic, and hypersonic flows treated in a generalized and uniform manner with combined viscous/inviscid effects. Relationships among various regimes of fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics with emphasis on applications to airplane, rocket, ground testing, and jet propulsion. Discussion of special topics according to students' interest. Prereq: E 5110, 5220, 5240 or equivalent.

6810 Advanced Boundary Layer Theory (3) Derivation and critical review of governing equations. Asymptotic solutions; similarity methods; boundary-layer transformations. Approximate integral methods; Cauchy-Kowalevski theorem; asymptotic approximations. Prereq: Mathematics 5610, Physics 4220.

6910 Advanced Topics in Gasdynamics (3) Selection of topics based on current interests of students: nonequilibrium transport phenomena, radiation gasdynamics, nonequilibrium gasdynamic flows, advanced kinetic theory, perturbation techniques. Prereq: Consent of instructor. May be repeated. Maximum 5 hrs.

**Nuclear Engineering**

**MAJOR DEGREES**

**Nuclear Engineering** M.S., M.E., Ph.D.

**Professors:**

P. F. Pasqua (Head), Ph.D. Northwestern, P.E.;

T. W. Kerlin, Ph.D. Tennessee; J. E. Mott, Ph.D., Minnesota; J. C. Robinson, Ph.D. Tennessee;

P. N. Stevens, Ph.D. Northwestern, P.E.

**Associate Professors:**

H. L. Dodds, Ph.D. Tennessee, P.E.;

J. B. Fussell, Ph.D. Georgia Institute of Technology; H. C. Roland, Ph.D. Tennessee;

C. D. Ware, Ph.D. Lincoln University.

**Assistant Professors:**

E. M. Katz, Ph.D. Tennessee; L. Miller, Ph.D.; Texas A & M, P.E.

The Department of Nuclear Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with concentrations in nuclear dynamics, nuclear reliability and safety, and medical and industrial applications.

**THE MASTER'S PROGRAM**

A graduate program leading to a degree of Master of Science is available for graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessity to take undergraduate courses before he/she enters the program.

The student must complete a program of study from appropriate courses which has been approved by the student's advisory committee and which includes the following:

1. A major consisting of a minimum of 18 quarter hours of graduate courses in nuclear engineering.
2. A minor of 9 quarter hours in mathematics.
4. Final examination covering the thesis and graduate course work.

An alternate program is available for the Master of Science degree which involves engineering practice rather than a thesis. The student must complete the following program of study which includes the following:

- Thirty-six quarter hours of course work similar to the requirements for the regular Master of Science program (see above).
- Twenty-four quarter hours of Nuclear Engineering 5980, Nuclear Engineering Practice. A student usually registers for 6 hours of Nuclear Engineering 5980 each quarter and investigates problems assigned by a member of the faculty. At the end of each quarter the student submits a written report and makes an oral presentation of the work.
- Final examination covering graduate course work and practice school problems.

**MASTER OF ENGINEERING PROGRAM**

A graduate program in Nuclear Engineering leading to the degree of Master of Engineering is available for those graduates with an accredited engineering degree or one which satisfies ECPD basic level criteria.

In addition to Graduate School requirements the following degree requirements must be met:

1. Thirty-six quarter hours of course work, 18 of which must be in graduate nuclear engineering.
2. A minimum of 9 hours of design project, thesis, or 24 hours of Nuclear Engineering Practice (5980). Documented proof of significant engineering experience may be submitted in lieu of the design project, thesis or Nuclear Engineering Practice, but in this case 45 hours of course work are required.
3. Nine hours of course work submitted must be from out of department.
4. A minimum of one-third of the program must be in engineering design, and one-third in one of, or a combination of, advanced mathematics, computer science, or basic sciences, or engineering sciences.
5. A candidate must pass a final oral examination on all work presented for the degree.

**THE DOCTORAL PROGRAM**

Students in the field of nuclear engineering desiring to study for the degree of Doctor of Philosophy must have a Bachelor of Science or Master of Science degree from a recognized university, with a major in engineering, and present at least a B average. All candidates will be required to demonstrate general competencies in the preparatory areas of nuclear engineering science, mathematics, and physics. At the same time, all candidates will be required to demonstrate special competencies in nuclear engineering.

Specific course requirements for the Ph.D. degree in Nuclear Engineering include:

1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.
2. A minimum of 36 quarter hours of credit in doctoral level courses.
3. A minimum of 45 quarter hours in nuclear engineering courses numbered 5000 and above (or the equivalent), at least 12 quarter hours of 6000-level courses. These are exclusive of thesis or dissertation credit.
4. A minimum of 18 quarter hours in mathematics, computer science, or statistics in courses beyond nuclear engineering unless unique requirements must be numbered 4000 or above.
5. A minimum of 9 quarter hours in courses numbered 5000 or above from a department other than nuclear engineering. The choice depends on the student's overall program and should expand his/her knowledge in a given field.
6. A reading knowledge of one foreign language will be determined by the student's doctoral committee.

4110-20-30 Introduction to Nuclear Reactor Theory (3, 3, 3) Nuclear structure; radioactive decay laws; neutron interaction; fission process, chain-reaction systems; diffusion equation; multigroup diffusion theory, neutron moderation; reactant, transfer, and energy coefficients. Prereq: Mathematics 3730 or consent of instructor.

4140 Nuclear Thermodynamics (3) Fusion reactions; properties of plasmas; plasma containment; plasma diagnostics; nuclear reactor design; Physical Chemistry 5610, Mathematics 4550.

5210-20-30 Nuclear Engineering Laboratory (3, 3, 3) Radiation detection and counting instrumentation, counting statistics, half-life and decay schemes, gamma spectrometry, cross-section measurements, analog computation, diffusion properties of neutrons, critical loading experiments, control rod calibration, statistical weight, shielding, xenon poisoning, prompt critical reactor behavior, fission density and adjacent flux. Prereq: 4140.

4610-30-30 Reactor Physics Systems (3, 3, 3) Nuclear structure, decay laws, neutron diffusion, time behavior of reactors, heat removal, analysis of reactor power plant; economic, safety, and environmental aspects of nuclear power. Prereq: Mathematics 4610, non-nuclear engineering students only.

4710 Energy Transport (4) Development of differential and integral equations for conservation equations; conduction, convection, and radiation heat transfer; applications to nuclear reactor fuel elements and heat exchangers. Prereq: 4610.

4720 Reactor Thermal Design (4) Hydrodynamics and heat transfer in boiling systems; boiling crises; fuel element thermal design, steam generator design. Prereq: 4710.
4730 Nuclear Reactor Design (3) First order reactor design, integration with non-nuclear heat transfer and power conversion system, economic evaluation; optimization procedures, description of typical systems. Coreq: 4130.

4810 Radiation Shielding (3) Types of radiation sources, gamma ray and neutron attenuation, biological effects of radiation, shield design. Prereq: Physics 3730, Mathematics 4550.

4820 Reactor Kinetics and Controls (3) Derivation of kinetic equations; basic kinetic parameters; transient response with feedback; control and protective systems. Prereq: 4110.

4840 Nuclear Reactor Safety (3) Presentation of reactor safety concepts and criteria; credible accidents; fission product release and transport; containment systems; accident analysis; engineered safeguards. Prereq: 4120.

4930 Nuclear Fuel Management (3) Discussion of problems associated with processing of nuclear materials; fuel cycle analysis; burnup calculation. Prereq: 4120.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time. Degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5110-20-30 Transport Processes in Nuclear Engineering (3, 3, 3) Momentum and heat transport; development of conservation equations; elementary theory of turbulence; heat transfer and flow through conduits; conduction; radiation; reactor core thermal area. Prereq: 4720 or equivalent. Mathematics 4710, 4550.

5210 System Dynamics (3) Transient analysis, Laplace transforms; frequency response, stability (linear and nonlinear), and sensitivity analysis by state variable methods. Dynamic analysis of distributed systems. Prereq: Consent of instructor.

5220 Reactor System Dynamics (3) Application of methods of general system dynamics to reactor systems. Modeling of neutronic and non-neutronic processes. Dynamics, stability, and control of zero power reactors and power reactor systems. Prereq: 5210, 4130 or equivalent.


5240 Reactor Instrumentation (3) Instrument components and systems for operation, control, and safety of nuclear reactors; role of instrumentation in public health and safety; engineered safeguards for nuclear power plants. Prereq: 4820, or consent of instructor.

5310-20-30 Nuclear Systems Reliability (3, 3, 3) System reliability analysis as applied to nuclear systems. Qualitative and quantitative methods. Coreq: Statistics 3450.

5510-20-30 Nuclear Systems (3, 3, 3) Various reactor types; flow diagrams, thermodynamic analysis, control methods, component descriptions of power systems using various reactor types and nuclear power economics. Prereq: 4610-20-30 or equivalent or consent of instructor.

5710-20-30 Nuclear Design (3, 3, 3) Analytical techniques for neutronic aspect of nuclear reactor core design. Multigroup discrete ordinates, multigroup PN theory, integral transport theory, perturbation theory, and others. Generation of required multigroup constants formulated with available point data and Nordheim treatment in slowing down region and gas kernel in thermal region. Prereq: 4130 or equivalent.

5740 Reactor Shielding (3) Application of analytic solutions of Boltzman transport equation to shield design problems. Spherical harmonics, moments methods, numerical solutions, adjoint calculations, and invariant imbedding cases studied. Prereq: 4810.


5840-50 Fast Breeder Reactors (3, 3) Special characteristics of fast breeder reactors; emphasis on LMFBR. Need for breeders; neutron physics and thermal characteristics of reactor core; development status of engineering components; fuel cycle cost analysis; safety; coolants other than sodium; world status of development.

5970 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

5980 Nuclear Engineering Practice (3-12) Experiences in solving and reporting on engineering problems. Prereq: Approval of Nuclear Engineering Department. May be repeated. Only Alternate Plan students may take this course. S/NC only.

6000 Doctoral Research and Dissertation

6110-20-30 Selected Topics in Reactor Theory (3, 3, 3) Transport theory, control rod theory, and perturbation theory. Selected topics from literature. Prereq: Consent of instructor.

6140 Radiation Shielding (3) Advanced topics in radiation shielding. Monte Carlo techniques and space radiation problems. Natural space radiators, energy, Precise radiators, dose conversion, probability, Selected neutron, gamma, and space-radiation shielding problems. Prereq: Consent of instructor.

6150 Reactor Dynamics (3) Special topics in reactor dynamics and control. Prereq: Mathematics 5630.

6710 Two-Phase Flow and Heat Transfer (3) Pool boiling and flow boiling; hydrodynamics of two-phase flow, boiling crises, two-phase instability, Prereq: 5130 or equivalent.
College of Home Economics

Lura M. Odland, Dean
Grayce E. Goertz, Associate Dean
Virginia S. Anagnost, Assistant Dean

Graduate study programs lead to the degree of Master of Science in Child and Family Studies; Consumer Studies and Housing; Public Policy; Crafts, Interior Design, and Housing; Food Science; Food Systems Administration; Home Economics Education; Nutrition; and Textiles and Clothing. Graduate study programs lead to the degree of Doctor of Philosophy in Home Economics with three options: interdisciplinary, food science, and nutrition. Graduate programs provide advanced specialized training needed for college and university teaching, for leadership positions in governmental and professional agencies, in the various professions in business, for secondary school and adult teaching, for research and for extended services.

GENERAL REQUIREMENTS FOR GRADUATE STUDENTS

Requirements for graduate study are prescribed by the Graduate School and by the student's major department. Students lacking adequate preparation may be required to take additional courses at the undergraduate level as prerequisites to graduate study. A student deficient in English may be required to take courses as necessary to remove the deficiency.

APPLICATIONS FOR ADMISSION

Two copies of the student's transcript and an application for admission are submitted directly to the Graduate School. In addition, a College of Home Economics application and three letters of recommendation are sent to the Associate Dean of the College of Home Economics. (Forms may be obtained from the college.) The Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for the application for admission in the interdisciplinary doctoral program, the Master's program in Child and Family Studies, and the Master's program in Consumer Studies and Housing: Public Policy.

In submitting applications for admission to graduate study in home economics, students are requested to indicate choice of major area of study.

GRADUATE ASSISTANTSHIPS AND FELLOWSHIPS

Information and application forms regarding graduate assistantships, fellowships and general requirements for admission to graduate study may be obtained from the department head in the area of the student's major interest or from the Associate Dean of the College of Home Economics for the interdisciplinary doctoral program.

PROGRAMS LEADING TO THE DEGREE OF MASTER OF SCIENCE

Thesis Option:

Majors and minors are offered in the following areas:
Child and Family Studies
Consumer Studies and Housing: Public Policy*
Crafts, Interior Design, and Housing
Food Science
Food Systems Administration
Nutrition
Textiles and Clothing

*Requirements include Crafts, Interior Design, and Housing; Consumer Studies and Housing: Public Policy; Textiles and Clothing; Agriculture, Economics, and Home Economics; Political Science; Library and Information Science; and Social Work.

Non-Thesis Option:

The non-thesis option is available for all majors listed under the thesis option and is the only option available for public health nutrition.

In addition to the regulations of the Graduate School, the non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field. At least 18 hours must be in the area chosen above.

GRADUATE FELLOWSHIPS

Students are requested to indicate choice of major area of study in the interdisciplinary doctoral program.

Major (includes minimum of 9 hours of 5000 courses) ....... 18 hrs
Collateral area(s) of study (includes minimum of 6 hours of 5000 courses) ............ 9 hrs

In some instances two related collateral areas may be selected with a minimum of 3 hours of a 5000 course in each.

Collateral area(s) of study may be chosen in an area other than in home economics with the approval of the appropriate professors.

An oral examination is required.

Note: Nine hours is the maximum credit allowed for special problems work and seminar work in any one area of home economics.

GRADUATE ASSISTANTSHIPS

The non-thesis option is available for all majors listed under the thesis option and is the only option available for public health nutrition.

In addition to the regulations of the Graduate School, the non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field. At least 18 hours must be in the area chosen above.

Programs leading to the degree of Master of Science in and 9 hours outside College of Home Economics.

Twelve hours in an area of home economics other than the area of study (consumer studies or housing) are required in the areas of study included in the interdisciplinary doctoral program.

The minimum requirements for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field. At least 18 hours must be in the area chosen above.

Graduate programs provide advanced specialized training needed for college and university teaching, for leadership positions in governmental and professional agencies, in the various professions in business, for secondary school and adult teaching, for research, and for extended services.

GENERAL REQUIREMENTS FOR GRADUATE STUDENTS

Requirements for graduate study are prescribed by the Graduate School and by the student's major department. Students lacking adequate preparation may be required to take additional courses at the undergraduate level as prerequisites to graduate study. A student deficient in English may be required to take courses as necessary to remove the deficiency.

APPLICATIONS FOR ADMISSION

Two copies of the student's transcript and an application for admission are submitted directly to the Graduate School. In addition, a College of Home Economics application and three letters of recommendation are sent to the Associate Dean of the College of Home Economics. (Forms may be obtained from the college.) The Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for the application for admission in the interdisciplinary doctoral program, the Master's program in Child and Family Studies, and the Master's program in Consumer Studies and Housing: Public Policy.

In submitting applications for admission to graduate study in home economics, students are requested to indicate choice of major area of study.

GRADUATE ASSISTANTSHIPS AND FELLOWSHIPS

Information and application forms regarding graduate assistantships, fellowships and general requirements for admission to graduate study may be obtained from the department head in the area of the student's major interest or from the Associate Dean of the College of Home Economics for the interdisciplinary doctoral program.

PROGRAMS LEADING TO THE DEGREE OF MASTER OF SCIENCE

Thesis Option:

Majors and minors are offered in the following areas:
Child and Family Studies
Consumer Studies and Housing: Public Policy*
Crafts, Interior Design, and Housing
Food Science
Food Systems Administration
Nutrition
Textiles and Clothing

*Requirements include Crafts, Interior Design, and Housing; Consumer Studies and Housing: Public Policy; Textiles and Clothing; Agriculture, Economics, and Home Economics; Political Science; Library and Information Science; and Social Work.

Non-Thesis Option:

The non-thesis option is available for all majors listed under the thesis option and is the only option available for public health nutrition.

In addition to the regulations of the Graduate School, the non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field. At least 18 hours must be in the area chosen above.

Programs leading to the degree of Master of Science in and 9 hours outside College of Home Economics.

Twelve hours in an area of home economics other than the area of study (consumer studies or housing) are required in the areas of study included in the interdisciplinary doctoral program.

Minimum 27 hours in and 9 hours outside College of Home Economics. Minimum of 27 hours 5000-6000 level courses and total minimum of 45 hours. Courses may be used to meet more than one requirement but all minimum requirements will need to be met.

**Requirements include those listed under the thesis option for the major in Consumer Studies and Housing: Public Policy except that 21 hours are needed in consumer studies or housing to include Home Economics or Consumer Studies and Housing: Public Policy.
Request for the non-thesis option must be made in writing to the department head, not later than the end of the first term in residence.

DOCTORAL PROGRAMS

The doctoral program in Home Economics provides three options for study: interdisciplinary, food science, and nutrition. The interdisciplinary option is available in all departments in the College.

The doctoral program with a major in Home Economics requires:

1. A minimum of 96 quarter hours in courses beyond the Bachelor's degree exclusive of credit hours for the Master's thesis to include a minimum of 12 quarter hours of 6000-level courses.
2. Selection of an option and fulfillment of the requirements as supervised by the faculty committee.
3. The faculty committee for each individual student shall determine whether a reading knowledge of a foreign language is required.
4. Written preliminary examinations.
5. Doctoral research and dissertation (minimum 36 hours; maximum 48 hours) may be included in the 96 hours presented for the degree.
6. A final examination.

Option Requirements

Interdisciplinary option:

1. Home Economics 6110-20, 6210.
2. Twenty-four to 36 hours from at least two departments in the College of Home Economics, representing one of the following concentrations.

   Individual and Family Behavior as related to development and change throughout the human life cycle. Emphasis may be on: normal developmental processes, in individuals and families; socialization through childhood, adolescence, and adulthood; behavior in diverse environmental and cultural settings; interaction processes within families; community services and planning to meet development needs of individuals and families.

   Physiology, Development and Well-being in humans throughout the life cycle. Emphasis for particular age groups may be on: physiological response to nutrient intake, improvement of nutritional status through informed community action; cultural, economic and technological influences on food selection.

   Environmental Factors in design, space planning, housing, food service systems, clothing, textiles, and crafts as they relate to human needs. Emphasis may be on: impact of: cultural, sociological, psychological, and economic change; technology through informed consumer; aesthetics in improving the quality of the environment.

   Consumers' Economic and Social Well-being throughout the life cycle. Emphasis may be on: the relationship between family structure and decision-making processes in the use of human resources; the effects of social, macro- and microeconomics and political decision-making patterns and other behavior; community programs to meet the socioeconomic needs of consumers.

   3. Fifteen to 24 hours in cognitive or supporting courses (mainly from departments of study major in the University) including courses to give sufficient competence in statistics or research methods needed for dissertation research. Additional courses will complement the option emphasis and dissertation research area.

   4. Doctoral research and dissertation will be based on a problem within the interdisciplinary option concentration.

   Food science option and food science with concentration in food systems administration:

   1. Three hours in research methods from Food Science 5510 or 5520 or Food Systems Administration 5210; 6 hours from Food Science 5610-20-30-40, 6110, Food Systems Administration 6110; and Zoology 5350 (Biometry) or equivalent.

   2. Twenty-four hours in 5000- and 6000-level courses in food science or in food systems administration.

   3. Nine hours in a collateral area (upon approval of student's faculty committee, 4000, 5000, and 6000 courses in collateral area may be substituted for 5000 and 6000 courses in food science or in food systems administration).

   4. Minimum of 4 hours of credit in doctoral seminar.

Nutrition option:

   1. Thirty hours of 5000 or 6000 courses in nutrition exclusive of research and Zoology 5350 (Biometry) or equivalent.

   2. Nine hours in a collateral area (upon approval of student's faculty committee, 4000, 5000, and 6000 courses in collateral area beyond the 9 hours may be substituted for 5000 and 6000 courses in nutrition).

   3. Minimum of 4 hours of credit in doctoral seminar.

SPECIAL WORKSHOPS

Workshops on special topics of current interest are offered periodically by the different departments in the College of Home Economics. These are of special interest to those desiring to work for advanced degrees. Announcements are sent upon request. Each summer the craft workshop program in Gatlinburg, Tennessee, is made possible through cooperative efforts of the College of Home Economics with agricultural organizations has so stimulated the work of selected theories relevant to child development.

3930 (3) Review of research relating to childrearing practices and prediction of later behavior. Prereq: 4020, 4210, and 6 hrs psychology.

3940 (3) Housing: Public Policy and Master's levels are available for students interested in home economics extension. At the doctoral degree level, programs of study may be planned in the interdisciplinary or in the food science or the nutrition options. A Master's degree major in Consumer Studies and Housing: Public Policy is particularly suitable for students interested in home economics extension, although Master's programs may be planned in any subject matter area of home economics with agricultural extension education as a collateral area. Additionally, four-week courses are offered in February each year for students particularly interested in home economics extension. Students interested in a graduate program and/or the four-week courses should contact the Associate Dean of the College of Home Economics.

Departments of Instruction

Numbers in parentheses following the course titles indicate quarter hours credit offered.

Child and Family Studies

MAJORS

Child and Family Studies

Consumer Studies

Housing: Public Policy

Home Economics

DEGREES

M.S. Ph.D.

Professors:

R. L. Hightower, Ph.D. Iowa; J. L. Kulipers, Ph.D. Michigan State.

Associate Professors:


Assistant Professors:


4100 Student Teaching in Preschool Settings (6) Increasing responsibility for planning and guiding groups of young children under supervision of head teacher includes 2 hr weekly seminar. Prereq: 1500, 3110, 3120, 3210, Coreq: 4111.

4210 Family Finance (3) Analysis of alternative ways of meeting financial problems encountered during life cycle of family.

4220 Conserving Time and Energy in the Home (3) Application of management principles to homemaking activities; evaluation of equipment, work centers and work procedures in terms of time and energy demands. Adaptations for the handicapped.

4230 Development in Infancy (3) Development during prenatal period and first fifteen months of life, interaction between infant and environment. Review of research relating to childrearing techniques for infant development, cooperation with national and local craft organizations. See also page 90.

5210 Family Finance (3) Analysis of alternative ways of meeting financial problems encountered during life cycle of family.

5220 Conservation of Time and Energy in the Home (3) Application of management principles to homemaking activities; evaluation of equipment, work centers and work procedures in terms of time and energy demands. Adaptations for the handicapped.

5230 Development in Infancy (3) Development during prenatal period and first fifteen months of life, interaction between infant and environment. Review of research relating to childrearing techniques for infant development, cooperation with national and local craft organizations. See also page 90.

5240 Adult Development and Aging (3) Adult life in our society. Adjustment to internal and environmental changes through middle and aged years. Prereq: 2110 or Home Economics 1510 or equivalent background in adult development of content of instruction.

4350 Advanced Child Development (3) Survey of selected theories relevant to child development with emphasis on research literature and research methodology. Prereq 4 hrs psychology and 6 hrs child development or equivalent.
4420 Learning Experiences with Parents (3) Dynamics of parent-teacher interaction. Emphasis on a variety of techniques for developing communication and working relationships between parents and teachers through experiences in a variety of settings. Prereq: 3610 or 4110 or equivalent.

4430 Family Relationships (3) Interpersonal relationships in family members and societal roles. Prereq: 3510 or 3515.

4610 Child in the Community (3) Needs of children; community agencies meeting these needs; visiting schools and agencies to the role of the child. Prereq: 2110 or Home Economics 1510 or equivalent.

4620 Administration of Programs for Young Children (3) Planning for staffing, housing, feeding, scheduling, and financing for day care of infants and young children, nursery school programs, and specialized programs for deprived preschool children. Prereq: 3110 or 3310 or 4110.

4630 Field Work in Child, Family and Consumer Studies (3-15) Opportunity for students to work in nursery schools or community agencies; focus on children, families, and personal concerns. Hrs arranged. May be repeated. Maximum 9 hrs.

4710 Contemporary Developments (1-3) Student-oriented study of special topics pertinent to the field; topics selected to be determined by students and instructor with departmental approval. Elective credit only. Prereq: Consent of instructor. May be repeated with departmental approval. Maximum 9 hrs.

4810 Afro-American Families (3) Historical background, contemporary family structure and relationships; emerging needs and programs. Prereq: 4hrs in social sciences.


4910 Afro-American Families (3) Historical background, contemporary family structure and relationships; emerging needs and programs. Prereq: 4hrs in social sciences.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-19) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty services. Consent of instructor. May not be used toward degree requirements. May be repeated. S/NC only.

5050 Practicum (1-12) Field experience in selected organizations that focus on solutions to problems in consumer studies. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5170 Consumer Economics (3) Consumer function, consumer profile, structure of consumer markets; government action relating to consumers; factors affecting prices of consumer goods.

5180 Family Financial Consultation (3) Analysis of family financial conditions, particularly common financial difficulties, avenues by which families are assisted. Field experience with consumer consulting services. Prereq: 4120, 4830, or 5170.

5190 Standards in Consumer Protection (3) Products and performance standards in consumer protection. Theoretical and operational questions related to consumer behavior and benefits to consumers. Prereq: 4830, 5170 or consent of instructor.

5210 Theories of Child Development (3) Prereq: 4350 or equivalent.

5220 Family Life Programs (3) School and community programs in family life; survey and evaluation; students concentrate on type best suited to their experience and future professional orientation. Prereq: 5210 or consent of instructor. 3 hrs family relationships, 3 hrs sociology. 2 hrs and 1 lab.

5310 Theory and Research on Human Sexuality (3) Cultural, social, and psychological dimensions of human sexuality. Major contributions from anthropological, sociological, and personality theory and research.

5410 Advanced Family Relationships (3) Problems in modern family life; individual adjustment, family relationships. Prereq: 5315, 4430, or consent of instructor.

5420 Parents and Children (3) Common problems of young children faced by parents and teachers; emphasis on methods available to modify problem behavior.

5430 Families in Crisis (3) Interpersonal transactions in disordered family behavior. Prereq: 5410 or equivalent.

5510 Survey of Research in Child and Family Studies (1-3) Research literature; locating, abstracting, reporting research studies. Prereq: 5530 or equivalent.


5610 Theories of Family Interaction (3) Theories of family interaction, regulatory agencies, standards, information dissemination, and evaluation of curriculum program models for education of infants and young children. Various school programs for infants and young children. Various program models for education of infants and young children. May be repeated. Maximum 9 hrs.

5620 Nursery School Administration (3) Organizing and operating schools and play groups for preschool children. Housing, staff, schedules, programs, financing. Prereq: 4110 or equivalent.

5640 Seminar in Programs for Infants and Preschool Children (3) Research related to programs for infants and young children. Various program models for education of infants and young children, methods of working with parents, and preschool program training. Prereq: 5650 or equivalent.

5650 Supervision in Preschool Programs (3) Guidance of students working in nursery school and day care centers. Guiding students through seminar and individual conferences, analyzing case study, various evaluation techniques. Prereq: 5640. 3 hrs and 12-lab hr.

5680 Nursery School Administration (3) Organizing and operating schools and play groups for preschool children. Housing, staff, schedules, programs, financing. Prereq: 4110 or equivalent.

5690 Seminar in Infant Development (3) Theory and research relating to development during infancy. Prereq: 4230.


5800 Problems in Child, Family and Consumer Studies (1-3) Advanced study of child development and family relationships. Prereq: 5540 or equivalent.

5840 Family Planning Programs (3) Community and family planning programs. Internship in planned parenthood programs and clinic. May be repeated. Maximum 9 hrs.

5850 Seminar in Child and Family Studies (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


5870 Advanced Topics (3) Individual study and group discussion of current problems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6250 Individual and Family Development—Physiological Determinants (3) Family members' physiological potential for growth and development to realization of human potential. Prereq: 6 hrs advanced child and family studies, 4 hrs nutrition, 4 hrs physiology, or equivalent.

6310 Individual and Family Development—Socialization (3) Processes through which individual learn to recognize their world. Cognitive processes involved in development across life span; efforts on the part of family, government, contemporary family structure and relationships. Prereq: 5210, 5410, or equivalent.

6410 Theories of Family Interaction (3) Theories and concepts of family interaction. Critical evaluation of theoretical formulations of contemporary research on family behavior. Prereq: 5410 or equivalent.

6450 Conceptual Frameworks for the Family (3) Theoretical perspectives for understanding family life. Exploration and applications of frameworks on theoretical and research levels. Historical to contemporary development of family studies. Prereq: Equivalent.

6540 Seminar in Programs for Infants and Preschool Children (3) Research related to programs for infants and young children. Various program models for education of infants and young children, methods of working with parents, and student training programs. Prereq: 5650 or equivalent.

6610-20 Applied Behavior Analysis in Natural Settings (3) Individual study and supervision of applied behavior analysis in natural settings. Prereq: 5420 or consent of instructor.

6710 Elements of Consumer Choice (3) Analysis of consumer behavior as primary consideration of consumer choice. Impact of affluence on consumers, and consideration of dynamic aspects of consumer behavior, including roles of aspirations, expectations, uncertainty and information. Prereq: 5710 or consent of instructor.

6720 Consumer Protection (3) Consumer protection, regulatory agencies, standards, information disclosure and other consumer protection legislation. Assumptions involved in these efforts and changing concepts in field. Prereq: 5170, 5190 or consent of instructor.

Crafts, Interior Design, and Housing* MAJORS

Crafts, Interior Design, and Housing M.S.

Consumer Studies and Housing: M.S.

Home Economics Ph.D.

Professor: R. G. Blakemore (Head), Ph.D. Florida State.

* The Crafts program is under revision.

Contact the Department of Art for further information.
College of Home Economics

Associate Professor: W. Moran, M.S. Wisconsin.

Assistant Professors: A. K. Farkas, Ph.D. Minnesota; K. Tepel, M.S. Massachusetts.

To be admitted to the Graduate School in the craft program a student must have in the professional field of major and technique. Work with creative design concepts is emphasized at the graduate level; media and technique are important only in so far as the experimentation with these concepts leads to philosophical and creative orientation of the designer-craftperson. Courses are, therefore, based on theory or philosophical concepts in order to facilitate the development of visual sensitivity in relation to design. Major emphasis will be on the visual image as a personal interpretation of the media. Because the philosophical orientation of the student varies widely, progression from one level to another is based on the understanding and communication of visual concepts.

An interdisciplinary course of study includes intensive training in the chosen areas of specialization such as ceramics, weaving, textile design, or interior design as well as courses dealing with the broader aspects of design. All student programs include: Seminar in Design (5040), Advanced Design Studio (5050), and research methods; in addition, crafts majors include Exhibition Design (4140).

An interdisciplinary program in Consumer Studies and Housing; Public Policy is available to students with interest in the social science approach to housing. Courses dealing with the design aspects of housing may be elected.

PI BETA PHI ARROWMONT SCHOOL OF CRAFTS

Graduate students in the area of crafts have an unique opportunity to participate in the summer program at the Pi Beta Phi Arrowmont School of Crafts, Gatlinburg, Tennessee; credit is granted through The University of Tennessee, Knoxville.

Instructors at the school are nationally and internationally recognized designers, designers who offer, in many instances, different approaches to those of the resident faculty; this further enriches the student's program of study. Craft courses are offered on the Knoxville campus in the summer quarter. Therefore, students attending UT during the summer for crafts study are required to attend the Pi Beta Phi Arrowmont School of Crafts and pay the additional registration, tuition, and laboratory materials fees required by that school.

ACQUISITIONS AND EXHIBITIONS

For crafts and interior design majors, the department reserves the right of acquisition and exhibition of work completed in its studios under the guidance of the faculty. Prospective graduate students should submit a portfolio of their undergraduate studio work to the department. This portfolio may include slides or original work.

4110 Home Wiring and Lighting Requirements (3) Service of electricity in modern homes; evaluation of lighting and wiring plans in terms of family desires and need for equipment. 1 hr and 2 labs.

4130 Contemporary Design (3) Furnishings and interiors; economic, technological and sociological influences on the development of design; changing living conditions; interrelation of architecture and furnishings. Significant designers and their work.

4145 Exhibition Design (4) Display of craft and interior design, in relation to materials, props and special exhibition areas. Emphasis on knowledge and application of the design principles and their relation to promotion, design construction, display and evaluation for two- and three-dimensional displays. Annual student Craft and Interior Design exhibit culminates quarter. Prereq: 4140 or equivalent.

4155 Interior Space Planning I (6) Analysis, planning and design of office environment; includes contract specifications. Prereq: 4265 or equivalent.

4165 Interior Space Planning II (6) Studio problems involving large scale nonresidential interior spaces such as restaurants, transportation facilities, stores, institutions. Prereq: 4155 or consent of instructor.

4310 Crafts in America (3) Craft movement; factors that contributed to growth and development. Educational, social, economic, and creative components leading to visual innovation and aesthetic concepts in development. Prereq: 4150 or equivalent.

4320 Family Housing Problems (3) Housing requirements of families. Reading and judging house plans: effective use of space; maintenance problems; housing regulations and restrictions; site selection and neighborhood development; financing procedures. Prereq: 6 hrs from Economics 2110-20-30.

4330 Care and Repair of Household Equipment (3) Care of equipment to give maximum service in relation to operation and service cost; understanding of common repair problems. Prereq: 4230. 1 hr and 2 labs.

4410 Craft Media (4) Possibilities and limitations of variety of craft media; understanding educational and social values of craft work. Designing and executing craft problems using inexpensive materials and tools. 3 labs.

4420 Leather Design (4) Relationship of design to function, techniques and materials. Creating leather objects of original design. Prereq: 4140 or equivalent. 1 hr and 2 labs.

4430 Plastics (4) Possibilities and limitations of various plastics; methods of fabrication; relation of design to function, processes, types of material and use of tools. Prereq: 4140 or equivalent. 1 hr and 2 labs.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only.

5040 Seminar in Design (3) Intensive reading, discussion and critical evaluation of twentieth-century design concepts, persons, motivation, and creative components leading to visual innovation.

5050 Advanced Design Studio (4) Strength, structural variability, and form potentials of design materials; search for aesthetic potential in functional forms in fiber constructions. 5361-Advanced experimentation using aesthetic concepts in development of two- and three-dimensional forms in metal design. 5362—Advanced experimentation using aesthetic concepts in development of two- and three-dimensional forms in weaving. 5362—Experimentation in unifying aesthetic concepts in preparation for graduate exhibition. Prereq: Previous work in metal design and consent of department head. Each course may be repeated one time.

5344-54-64 Wood Design I, II, III (4, 4, 4) 5344—Initial development of theory for investigation of aesthetic concepts in two- and three-dimensional forms in wood design. 5354—Advanced experimentation using aesthetic concepts in surface decoration of textiles. 5353—Advanced experimentation in unifying aesthetic concepts in surface decoration of textiles. 5363—Experimenting in unifying aesthetic concepts in preparation for graduate exhibition. Prereq: Previous work in textile design and consent of department head. Each course may be repeated one time.

5345-55-65 Enameling I, II, III (4, 4, 4) 5345—Initial development of theory for investigation of aesthetic concepts in two- and three-dimensional forms in enameling. 5355—Advanced experimentation using aesthetic concepts in development of two- and three-dimensional forms in enameling. 5365—Experimenting in unifying aesthetic concepts in preparation for graduate exhibition. Prereq: Previous work in enameling and consent of department head. Each course may be repeated one time.

5346-56-68 Plastics I, II, III (4, 4, 4) 5346—Initial development of theory for investigation of aesthetic concepts in two- and three-dimensional forms in plastic. 5356—Experimenting in unifying aesthetic concepts in development of two- and three-dimensional forms in plastic. 5366—Experimenting in unifying aesthetic concepts in preparation for graduate exhibition. Prereq: Previous work in plastics and consent of department head. Each course may be repeated one time.

5347-57-67 Ceramics I, II, III (4, 4, 4) 5347—Initial development of theory for investigation of aesthetic concepts in two- and three-dimensional forms in ceramics. 5357—Advanced experimentation using aesthetic concepts in development of two- and three-dimensional forms in ceramics. 5367—Experimentation in unifying aesthetic concepts in preparation for graduate exhibition. Prereq: Previous work in ceramics and consent of
department head. Each course may be repeated one time.

5350-60-70 Fabric Structures I, II, III (4, 4, 4)
5350—Initial development of theory for investiga-
tion of aesthetic concepts using nonwoven pro-
cesses. 5360—Advanced experimental use of aes-
thetic concepts in design of fabric structures.
5370—Experimentation in un-
fying concepts in preparation for graduate ex-
bition. Prereq: Previous work in ceramics and
consent of department head. May be repeated.
Maximum 8 hrs.

5368 Ceramics—Glaze Calculation (4) Experi-
mentation with various types of clay bodies and
glazes for reduction and oxidation firing atmos-
pheres. Prereq: Previous work in ceramics and
consent of department head. May be repeated.
Maximum 8 hrs.

5398 Ceramics—Kiln Construction (4) Designs
for and construction of various sizes and types
of kilns and burners systems which promote re-
duction and oxidation firing atmospheres.
Prereq: Previous work in ceramics and
consent of department head. May be repeated.
Maximum 8 hrs.

5410 Advanced Problems (3) Individual develop-
ment of techniques and appreciation. Prereq: 9
hrs and 9 credits. Prereq: Consent of

5510 Environmental Factors in Interior Design (3)
Human factors and associated research tech-
niques related to design of interior architectural
environmetal. Prereq: Development of design implications
from anatomy, physiology, anthropometry, and
behavioral sciences. Prereq: 8 hrs behavioral
science and 6 hrs natural science or consent of
instructor.

5520 Environmental Factors in Interior Design (3)
Systematic design methodology as applied to
design of microenvironments using human fac-
tors information. Prereq: 6 hrs behavioral sci-
ence, and 6 hrs natural science or consent of
instructor.

5530 Environmental Factors in Interior Design (3)
Human factors and systematic design methodol-
gy applied to analysis, synthesis, and evalua-
tion of research-oriented interior design proj-
ects. Comprehensive design research project by
2- or 3-member teams. Prereq: 8 hrs behavioral
science, and 6 hrs natural science or consent of
instructor.

5610 Furniture Design (3) Analysis of human fac-
tors data in design of body support, task sup-
port, and storage furniture pieces and systems;
production of construction drawings and scale
models. Prereq: Consent of instructor.

5613 Housing Management (3) Role and func-
tions of housing management specialist in prob-
lems of private and assisted housing manage-
ment. Prereq: 4350 or consent of instructor.

5614 Housing Regulations and Controls (3) Func-
tion of regulations and other control practices
and mechanisms as determinants of nature,
availability of housing in local communities by
various user groups. Prereq: 4320 or consent of
instructor.

5615 Housing Programs and Policies (3) Analysis
of private and public programs and policies to
promote realization of suitable homes and living
environments for families. Economic and social
problems relating to national housing objectives.
Prereq: 4320 or consent of instructor.

5620 Experimental Methods in Household Equip-
ment (3) Research methods and techniques in
determining performance of household equip-
ment. Prereq: 2430 or consent of instructor. 1 hr
and 2 labs.

5630 Environmental Requirements for Family
Work Centers (3) Trends in planning work center
areas such as kitchen and laundry; adequacy
of environment, surface treatment, facilities and
costs; problems of installation and remodeling.

5810 Crafts (1-4) Advanced study in crafts.
Hours and credit arranged. Prereq: Consent of
department head and professor in charge of in-
vestigation. May be repeated. Maximum 8 hrs.

5820 Interior Design (1-3) Advanced study in in-
terior design. Hours and credit arranged. Prereq:
Consent of department head and professor in
charge of investigation. May be repeated. Maxi-
mum 8 hrs.

5830 Problems in Housing (1-3) Advanced study
in housing. Hours and credit arranged. Prereq:
Consent of department head and professor in
charge of investigation. May be repeated. Maxi-
mum 8 hrs.

5910-20-30 Seminar (1-4, 1-4, 1-4) Hours and
credit arranged. Prereq: Consent of instructor.

6110 Contemporary Housing Issues and Prob-
lems (3) In-depth study and group discussion of
diverse issues and problems related to housing.
Prereq: Consent of instructor.

6120 Advanced Topics in Housing Research (3)
Various concepts, theories and methodologies
of social sciences in housing research. Prereq:
Consent of instructor.

6210 Environmental Design Analysis (3) Ad-
vanced methodology in psychology of envi-
ronmental design, multidisciplinary research

6320 Role of Crafts in Society (3) Comprehensive
individual study and group discussion of ad-
vanced concepts and current problems in crafts.
Prereq: 4310, 5040, 6 hrs of graduate level soci-
ology, or consent of instructor.

6410 Conceptual Development in Craft Design (3)
Advanced concepts in use of visually per-
cieved design elements as demonstrated in hard-
crafted objects. Prereq: 5040, 6 hrs of gradu-
ate level psychology, or consent of instruc-
tor.

6420 Perspectives in Crafts and Interior Design (3)
Historical influences related to contemporary
crafts in interior design. Prereq: 5040, 6 hrs of
graduate level art history, or consent of
instructor.

Courses offered periodically only at the Pi
Beta Phi Arrowmont School of Crafts, Gatlin-
burg, Tennessee. Courses may be repeated.

3211-21-31 Metal Design (1-4, 1-4, 1-4)
3211-21-31 Textile Design (1-4, 1-4, 1-4)
3611-21 Wood Design (1-4, 1-4, 1-4)
3711-21 Enameling (1-4, 1-4, 1-4)
4311 Crafts in America (1-4) (Same as 4310.)
4411 Craft Media (1-4) (Same as 4410.)
4421 Leather Design (1-4) (Same as 4420.)
4431 Plastics (1-4) (Same as 4430.)
4511-21-31 Ceramics (1-4, 1-4, 1-4, 1-4)
4621 Studio Problems in Leather Design (1-4)
4631 Studio Problems in Metal Design (1-4)
4641 Studio Problems in Weaving (1-4)
4651 Studio Problems in Textile Design (1-4)
4661 Studio Problems in Wood Design (1-4)
4671 Studio Problems in Enameling (1-4)
4681 Studio Problems in Plastics (1-4)
4691 Studio Problems in Ceramics (1-4)
5311-21-31 Metal Design (1-4, 1-4, 1-4)
5441-54-64 Wood Design (1-4, 1-4, 1-4) (Same as
5344-54-64.)
5445-55-65 Enameling (1-4, 1-4, 1-4) (Same as
5345-55-65.)
5446-56-66 Plastics (1-4, 1-4, 1-4) (Same as 5346-
56-66.)
5447-57-67 Ceramics (1-4, 1-4, 1-4) (Same as
5347-57-67.)
5811-21-31 Problems in Related Art, Crafts and In-
terior Design (1-4, 1-4, 1-4) (Same as 5910-20-30.)
5911-21-31 Seminar in Related Art, Crafts and In-
terior Design (1-4, 1-4, 1-4) (Same as 5910-20-30.)

Food Science, Nutrition, and Food
Systems Administration

MAJORS

DEGREES

Food Science M.S.
Nutrition M.S.
Food Systems Administration M.S.
Ph.D.

Professors:
R. E. Beauchene (Head), Ph.D. Kansas State;
A. M. Campbell, Ph.D. Cornell; G. E. Goertz,
North Dakota State; J. M. Hitchcock, Ph.D.
Wisconsin; L. M. Oland, Ph.D. Wisconsin;
K. G. Sande Island; J. P. Savage, Ph.D. Wisconsin;
J. T. Smith, Ph.D. Missouri; M. A. Smith
(Memphis), Ph.D. Tennessee.

Associate Professors:
B. L. Beach, Ph.D. Wisconsin; L. A. Eckhert,
Ph.D. Tennessee; D. T. Hubbard, Dr. P. H.
Tulane; D. E. Lyon, M.S. Cornell; M. P. Penfold,
Ph.D. Tennessee; M. N. Perry, Ph.D.
Tennessee; M. N. Traylor, M.P.H. California
(Berkleoe)

Assistant Professors:
F. E. Andrews, Ph.D. Ohio State; M. D. Brooks
(Memphis), M.S. Alabama; G. W. Disney, Ph.D.
Tennessee; R. L. Mason, M.S. Tennessee;
J. D. Skinner, Ph.D. Oregon State;

Food Science

4000 Origin of Food and Foodways (3) Food ori-
gin and development of individual and group
foodways. Prereq: 8 hrs social science or hu-
manities.

4010 Introductory Experimental Food Science (3)
Physical and sensory evaluation in experimental
with fats, high protein foods, and batter and
dough systems. Prereq: 3510. 2 hrs and 1 lab.

4020 Experimental Food Science (3) Individual
experimentation and its relation to the research
literature. Prereq: 4010, Nutrition 3320 recom-
manded. 1 hr and 2 labs.

4040 Food in Contemporary Society (3) Con-
sumer's options, responsibility and potential in-
fluence with respect to food supply.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not other-
wise registered during any quarter when such a
student uses university facilities and/or faculty
time before degree is completed. May not be
used toward degree requirements. May be re-
peated. 5 INC only.

5140 Foods and Nutrition: Physiochemical Prin-
ciples (3) Thermodynamics, physiochemical
properties of proteins, carbohydrates and lipids;
chemistry of colloid state; chemical kinetics;
specialized kinetics of enzymatic processes.
Prereq: Nutrition 3330 and Mathematics 1540 or
equivalent.

5150 Food Texture (3) Classification of foods ac-
cording to textural parameters; instrumentation
in evaluation of textures. Prereq: 4010 or Food
Technology 4920; Plant and Soil Science 3610 or
equivalent, or consent of instructor.

College of Home Economics 91
5520 Food Sensory Testing Methods (3) Principles and methodology of sensory evaluation of foods; applied to individual problems; analysis of sensory data. Prereq: 4010; Plant and Soil Science 3610 or equivalent; or consent of instructor.

5530 Advanced Experimental Food Science (3) Application of advanced research methods to individual problems. Prereq: 5510-20 or consent of instructor.

5550 Food Behavior of the Individual (3) Development of and changes in choices of food and food habits of individual. Prereq: 4000; 3 hrs of nutrition, or consent of instructor.

5560 Foodways in the United States (3) Current foodways of selected subcultures in United States; historical basis for their development. Prereq: 4000; 3 hrs of nutrition, or consent of instructor.

5610-20 Advanced Food Science (3, 3) Biochemical and biophysical interactions in food. Must be taken in sequence. Prereq: 4010; Nutrition 3320 or equivalent; or consent of instructor.

5630 Carbohydrates and Fats in Relation to Food Science (3) Physical and chemical characteristics of the proteins of milk, eggs, flour, and meat with emphasis on their behavior in food. Prereq: 4010; Nutrition 3220-30 or equivalent.

5640 Proteins in Relation to Food Science (3) Physical and chemical characteristics of the proteins of milk, eggs, flour, and meat with emphasis on their behavior in food. Prereq: 4010; Nutrition 3220-30 or equivalent.

5700 Current Programs and Trends in Food Science (1-3) Recent advances in food science, impact on curricular considerations, and implications for teachers, extension workers, and dietitians. Prereq: Consent of instructor. May be repeated.

5800 Problems in Food Science (1-3) Advanced study from field of food science. Prereq: Consent of department head and professor in charge of investigation. May be repeated.

5850 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor.

5890 Seminar in Food Science (1-3) Prereq: Consent of instructor. May be repeated.

6000 Doctoral Research and Dissertation

6110 Advanced Topics in Food Science (3) Comprehensive individual study and group discussion of topics related to current problems in food science. Prereq: Consent of instructor. May be repeated.

6210 Food Dispersions (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5850.

6210-20 Structure of Food Plants and Animal Tissues (3, 3) Histological structure of food plants and animal tissues related to physical characteristics and chemical properties of components. Prereq: 5630-40.

6500-20 Food and Sociocultural Change (3, 3) Critical evaluation of factors and interrelationships affecting food intake and consumption patterns. Prereq: Must be taken in sequence. Prereq: 5520 or 5560; or consent of instructor.

6900 Seminar (1-3) May be repeated. S/JNC only.

Nutrition

3310 Organic Chemistry (4) Emphasis on subjects leading to 3320-30. Textiles and Clothing 3520. Prereq: General Chemistry. 3 hrs and 1 lab. Not for graduate credit for nutrition majors.

3320 Food Analysis (4) Elementary quantitative analysis; techniques; theory. Prereq: 3310 or equivalent. 3 hrs and 1 lab. Not for graduate credit for nutrition majors.

3330 Physiological Chemistry (3) Metabolism of carbohydrates, lipids, and proteins. Role of vitamins and minerals in metabolism. Not for graduate credit for science, nutrition and food systems majors. Not for graduate credit for nutrition majors.

3339 Physiological Chemistry Laboratory (1) Prereq: 3320; Coreq: 3330. 1 lab. Not for graduate credit for nutrition majors.

4010 Reproductive and Developmental Nutrition (3) Nutritive requirements for expectant mothers, infants, and preschool children. Prereq: 6 hrs of nutrition. 2 hrs and 1 lab.

4020 Nutrition for Children, Adolescents and Adults (3) Application of basic principles and research findings to nutrition for children, adolescents and adults. Prereq: 8 hrs of nutrition. 2 hrs and 1 lab.

4030 Community Nutrition (3) Nutrition problems and services in the community; supervised field experiences are integral part of the course. Prereq: 6 hrs of nutrition.

4100 Introduction to Nutrition Research (3) Discussion of principles and laboratory experiences. Prereq: 6 hours of nutrition. 2 hrs and 1 lab.

4230 Nutrition in Disease (4) Nutrition problems in diseases influenced by diet. Prereq: 3410. 2 hrs and 1 lab.

4231 Clinical Experience in Diets (1) Planned clinical experience in applying principles of nutrition in disease. Coreq: 4230.

4240 Nutrition in Disease II (3) Interdisciplinary lectures and discussions on the metabolic processes of normal and diseased organs and tissues and the dietary or behavior modifications required. Prereq: 4230. Designed for senior students in the coordinated undergraduate program in dietetics.

4430 Diet and Drug Therapy (3) Effect of drug therapy on absorption and utilization of nutrients, and effect of diet on absorption, utilization and toxicity of drugs. Prereq: 3410 or consent of instructor.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or facility time before degree is completed. May not be used toward degree requirements. May be repeated. S/JNC only.

5110 Advanced Physiological Chemistry (4) Bioenergetics and related metabolism of nutrients. Prereq: 3330 or equivalent. 3 hrs and 1 lab.

5120 Advanced Physiological Chemistry (3) Nutritional factors related to body fluids, gas transport, and endocrine function. Prereq: 3330.

5140 Foods and Nutrition: Physiochemical Principles (3) Thermodynamics; physiochemical properties of proteins, carbohydrates and lipids; chemistry of colloidal state; chemical kinetics; specialized kinetics of enzymatic processes. Prereq: Nutrition 3330 and Mathematics 1540 or equivalent.


5230 Experimental Methods in Nutrition (3) Use of small animals in experimental nutrition. Prereq: 3320-30, 3410. 2 hrs and 1 lab.


5310 Community Nutrition (3) Nutrition problems and services in community; supervised field work. Prereq: 3410 and consent of instructor. 3 labs.

5320 Community Nutrition (3) Observations and participation in nutrition programs of local and state agencies. Prereq: 5310 and consent of instructor. 3 labs.

5330 Community Nutrition (3) Nutrition programs of state and federal agencies; preparation of materials for nutrition teachers; extension services; supervised field work. Prereq: Consent of instructor. 3 labs.

5340 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 5320 and consent of instructor. S/JNC only.

5360 Mental Retardation or Other Developmental Disorders of Childhood (3) Multidisciplinary core course required of all full-time students training at Child Development Center, UT Center for the Health Sciences, Memphis. Prereq: Consent of department head.

5410-20 Human Nutrition (3, 3) Functions of carbohydrates, proteins, fats, minerals and vitamins. Nutritional requirements of man through life span and practical problems in meeting requirements. Prereq: 3410 and 5110.

5430 Physiological Bases for Diets in Disease (3) Development in dietary treatment of disease in which nutrition plays a major role. Prereq: 5210 or equivalent.


5460 Survey methods in Human Nutrition (3) Food consumption, food practices and nutritional status of population groups. Prereq: 5210 or 5410-20. 2 hrs and 1 lab.

5480 World Food Supply and Human Nutrition (3) Food supplies and food practices as related to human nutrition throughout world. Regional, national and international agencies concerned with food and nutrition problems. Prereq: 5210 or 5410-20.

5470 Nutrition and Aging (3) Nutritional problems of aging individual, nutritional requirements, dietary intakes, and effect of nutrition on rate of biological aging. Prereq: 5210 or consent of instructor.

5610 Nutrition in Mental Retardation and Developmental Disorders of Childhood (1-12) Interdisciplinary diagnosis and treatment of developmentally handicapped child. Role of nutritionist; clinical experience and lectures at Child Development Center, Center for the Health Sciences, Memphis. Prereq: Consent of department head.

5700 Current Programs and Trends in Nutrition (1-3) Recent developments in field of nutrition and implications for dietitians, extension workers, dietitians, public health nutritionists, and others in related fields. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5800 Problems in Nutrition (1-3) Advanced study selected from field of nutrition. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs.

5950-60 Seminar (1, 1) May be repeated.

6000 Doctoral Research and Dissertation

6110 Advanced Topics in Food Science (3) Comprehensive individual study and group discussion of topics related to current problems in food science. Prereq: Consent of instructor. May be repeated.

6210 Food Dispersions (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5850.

6210-20 Structure of Food Plants and Animal Tissues (3, 3) Histological structure of food plants and animal tissues related to physical characteristics and chemical properties of components. Prereq: 5630-40.

650-20 Food and Sociocultural Change (3, 3) Critical evaluation of factors and interrelationships affecting food intake and consumption patterns must be taken in sequence. Prereq: 5520 or 5560; or consent of instructor.

6900 Seminar (1-3) May be repeated. S/JNC only.
Food Systems Administration

4130 Food Systems Administration (3) Functions of management applied to food service systems. Prereq: 3110.

4140 Food Systems Personnel Development (3) Development of training programs for food systems personnel. Prereq: 4130 or consent of instructor.

4150 Design and Layout of Food Service Systems (3) Design of physical facilities and selection and purchasing of equipment for food service systems. Prereq: 3110 or consent of instructor.

4250 Food and Lodging Managerial Cost Control (3) Cost analysis for control. Use of financial statements for decision making for food and lodging systems. Prereq: 4130, 2130.

4260 Food and Lodging Physical Plant, Planning and Maintenance (4) Feasibility, planning development and construction of food and lodging physical plant and maintenance. Electrical, mechanical, heating, plumbing, air conditioning and ventilation and illumination systems. Types of building materials and construction. Prereq: 3110, 4150 or consent of instructor. 3 hrs and 1 lab.

4270 Food and Lodging Information Systems (3) Qualitative and quantitative analysis of information systems for decision making in food and lodging operations. Prereq: 4130, 4250, Office Administration 2750.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5110-20 Experimental Quantity Food Study (3, 3) Analysis of food production, holding environment, and service problems related to quality of food prepared in volume. Management resources. Prereq: 4130, 3110, or consent of instructor.

5210 Methods of Food Systems Research (3) Research methods applicable to food systems administration. Prereq: 4130, Statistics 5211 or equivalent.

5220 Experimental Design of Food System Facilities (3) Environment in which food is prepared, held, and served in volume. Prereq: 4130. 1 hr and 2 labs.

5230 Food Systems Evaluation (3) Management resources in food systems. Standards for control. Prereq: 4130, or consent of instructor.


5310 Administration of Food Service Delivery Systems (3) Role and responsibilities of administrator in maintaining desired qualitative and quantitative standards in food service delivery system. Prereq: 3110 or consent of instructor.

5500 Clinical Training in Health Care Agencies (3) Instructional and supervisory techniques in clinical settings by nurses and dietitians for training of entry-level health care providers. Prereq: Nursing 4760 or 4143 or consent of instructor.

5700 Current Programs and Trends in Food Systems Administration (1-3) Recent advances in food systems administration and implications for district, school, or hospital food service directors and others in related fields. Prereq: Consent of instructor. May be repeated.

5800 Problems in Food Systems Administration (1-3) May be repeated.

5860 Field Experience (3-9) Planned administrative experience in food service system. Prereq: Consent of instructor.

5900 Seminar in Food Systems Administration (1-3) May be repeated.

6110 Advanced Topics in Food Systems Administration (3) Comprehensive individual study and group discussion of current problems in food systems administration. Prereq: Consent of instructor.

6210 Manpower Planning and Training for the Food Service Industry (3) Identification of manpower needs by skill levels, programs for personnel in food service industry. Prereq: 4140, 5210 or consent of instructor.

6310-20 Quantitative Methods to Control Resources in Food Service Systems (3, 3) Interrelationships of resources and evaluation of efficiency and effectiveness in food service systems. Prereq: 5230 or consent of instructor. Taken in sequence. Credit for 6310 contingent upon completion of 6320.

6900 Seminar (1-3) May be repeated. S/NC only.

Home Economics

MAJOR

DEGREE

Professors:

L. M. Grind (Dean), Ph.D. Wisconsin, D.Sc. Rhode Island; G. E. Goertz (Associate Dean), Ph.D. Kansas State.

Assistant Professor:

V. S. Anagnost (Assistant Dean), M.S. Tennessee.

5660 Practicum (1-12) Field experience in selected organizations that focus on interdisciplinary solutions to multilevel problems of society. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

5100 International Studies (1-15) Student- or staff-initiated course for study in foreign country. Prereq: Consent of professor in charge of investigation. Hrs and credit to be arranged. May be repeated. Maximum 12 hrs.

5210 History and Philosophy of Home Economics (3) Historical development of home economics; survey of concepts and philosophy of component disciplines and analysis of current programs; emphasis on projection of future developments.

5220 Development of Community Services Programs (3).

5230 Evaluation of Community Services Programs (3) Purposes of evaluation, clarification of objectives and procedures for determining progress.

5600 Home Economics in the Community (3) Role of home economists in community and how interactions among professionals of all community resources facilitate finding solutions for and/or solving problems of individuals, families, and communities related to quality of life. Prereq: Agricultural Economics 4320 or Economics 5340 or Planning 4110 or Child and Family Studies 5700 or consent of instructor.


5800 Problems in Community Services (1-3) Prereq: Consent of professor in charge of investigation. Hrs and credit to be arranged. May be repeated. Maximum 9 hrs.

5900 Seminar in Human Resource Development (1-3) May be repeated. S/NC only.

6000 Doctoral Research and Dissertation

5110-20 Theoretical Issues in Human Resource Development (3) Role and philosophy, and administrative issues for human resource development. Prereq: 12 hrs of 5000-level courses representing 2 areas of home economics.

5121 Advanced Topics (3) Comprehensive individual study and group discussion of individual and family behavior, physiological development and well-being, environmental factors, and economic and social well-being. Prereq: 5110. May be repeated.

6500 Methodological Issues in Home Economics (3) Advanced methodology in home economics, interdisciplinary research methods and issues. Prereq: 5000. May be repeated.

6900 Seminar (1-3) May be repeated. S/NC only.

Home Economics Education

Graduate study in home economics education provides for an M.S. in Home Economics Education and opportunity for participation in the Ed.D. program in Vocational-Technical Education in the College of Education. (See page 60 for staff and course offerings.)

Textiles and Clothing

MAJORS

TEXTILES AND CLOTHING

DEGREES

M.S.

Ph.D.

Home Economics

Professor:

A. J. Treece (Head), Ph.D. Ohio State.

Associate Professors:

L. Ford, Ph.D. Pennsylvania State; B. C. Goswami, Ph.D. Manchester (England); C. J. Noel, Ph.D. Notre Dame.

Faculty Associate:

T. L. Vigo, Ph.D. Tulane.

Assistant Professors:

C. E. Cox, Ph.D. Tennessee; R. P. Dowlen, M.S. Tennessee; M. F. Drake, Ph.D. Pennsylvania State; L. A. Kocher, Ph.D. California (Davis).

4210 Elementary Textile Microscopy (3) Microscopic techniques as applied to the study of textile fibers and fabrics. Prereq: 4010, 1 hr and 2 labs.

4240 Design Analysis II (3) Interpretation of dress design terminating in finished garments developed through the media of draping.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5110 Textile Testing and Methods of Research in Textiles (3) Physical and chemical testing. Research methods. 3 labs.

5120 Advanced Problems in Textiles and Clothing (3) Refresher course; new developments in textiles. Selecting fabrics, agencies aiding consumer; and individual problems in textile field. 2 hrs and 1 lab.

5130 Advanced Tailoring (3) Comparison of hand tailoring and trade methods used in making suits, coats, or costumes. 3 labs.

5150 Principles of Design Analysis (3) Application of color, pattern theory to garment design incorporating relationships of fabric geometry, texture, hand, and surface ornamentation to design. Prereq: Consent of instructor. 1 hr and 2 labs.

V. S. Anagnost (Assistant Dean), M.S.

L. M. Odland (Dean), Ph.D. Wisconsin, D.Sc.

Ph.D. Kansas State.

M.S.

L. A. Kocher, Ph.D. California (Davis).

R. P. Dowlen, M.S.

M. F. Drake, Ph.D.

Toledo, Ph.D.

B. C. Goswami, Ph.D.

Manchester (England).

C. J. Noel, Ph.D.

Notre Dame.

T. L. Vigo, Ph.D.

Tulane.

C. E. Cox, Ph.D.

Tennessee.

R. P. Dowlen, M.S.

Tennessee.
5160 Review of Literature (3) Intensive survey and evaluation of recent literature; implications for further research.

5170 Social, Psychological and Economic Aspects of Clothing as it relates to human behavior. Prereq: 6 hrs or equivalent from each of following areas: sociology, psychology, economics.

5180 Advanced Textile Economics (3) Economic problems or problem areas of current importance in textile and apparel industries—production, consumption, and governmental policy. Prereq: 5420, 6 hrs economics or consent of instructor.

5210 Evaluation of Instructional Materials in the Field of Textiles and Clothing (3) Evaluating instructional materials in communicating information in various areas of textiles and clothing. 1 hr and 2 labs.

5220 Historic Textiles (3) Development of textile industry in world, fibers used, design, and color.

5240 Practicum (1-9) Off-campus experience with business, industry, governmental agencies and civic groups; preplanned; supervised. Prereq: Consent of major advisor and department head. May be repeated. Maximum 9 hrs. S/NC only.

5250-60-70 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including polymerization, reactions, dyeing, and finishing. 5250 must be taken first, 5260 and 5270 need not be taken in sequence. 5250—Emphasis on structure; property relationships and reactions of fibers. 5260—Emphasis on fabric finishes. 5270—Emphasis on dyes and dyeing. Prereq: 3420 or equivalent, 1 qtr organic chemistry. 2 hrs and 2 labs.

5310 Fashion Analysis (3) Fashion as social and economic force; evolutionary theories of fashion operation. Prereq: 6 hrs each of sociology and economics.

5320 Problems in Historic Costume (3) Variable flow of styles in relation to cultural determinants. Prereq: 3480 or consent of instructor. May be repeated. Maximum 9 hrs.

5710-20-30 Current Programs and Trends in Textiles and Clothing (1-3, 1-3, 1-3) Pertinent developments and trends in textiles and/or clothing and implications for new types of programs, techniques, TV and/or curricula approaches. Content and emphasis vary according to changes in field and needs of groups serviced. Prereq: Consent of instructor.

5800 Problems in Textiles and Clothing (1-3) Advanced study selected from field of textiles and clothing. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs.

5900 Seminar in Textiles and Clothing (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6010 Advanced Studies in Textiles and Clothing (3) Independent analysis of major philosophies, theories, methods, and research. Prereq: 5160 or consent of instructor. May be repeated. Maximum 8 hrs.

6110 Selected Issues in Textiles and Clothing (3) Advanced topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6140 Selected Behavioral Theories in Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5170, 6 hrs of graduate level sociology or psychology, or consent of instructor.

6160 Social-Psychological Theories of Clothing Consumption (3) Analysis and evaluation of social science theories of consumer behavior in relation to textiles and apparel. Prereq: Child and Family Studies 5170, 6 hrs of graduate level sociology or psychology, or consent of instructor.
Aviation Systems

MAJOR
Aviation Systems

DEGREE
M.S.

Lead Professor:
M. A. Wright, Ph.D. Wales.

Professors:
W. Frost, Ph.D. Washington; W. F. Jacobs, Ph.D. Goettingen (Germany); A. A. Mason, Ph.D. Tennessee; J. M. Wu, Ph.D. California Institute of Technology; R. L. Young, Ph.D. Northwestern.

Associate Professors:
F. G. Colline, Ph.D. California (Berkeley); R. D. Kimberlin, M.S. Tennessee; J. R. Maus, Ph.D. North Carolina State.

Assistant Professors:
W. B. Baker, Jr., Ph.D. Tennessee; W. J. Boaz, M.S. Florida State; V. K. Smith, III, Ph.D. Georgia Institute of Technology.

The University of Tennessee Space Institute offers a program leading to the Master of Science with a major in Aviation Systems. The Aviation Systems program is designed for those who possess Bachelor's degrees in engineering or science and who wish to study under a "systems philosophy" toward careers in research and development or administration in various phases pertinent to aviation. The program features 18 quarter hours major field credit in various aspects of aviation systems, 6 or more quarter hours credit in each of the areas of research, development and administration, and electives which permit further specialization to either area.

To qualify for admission to this program, the applicant must possess a Bachelor's degree in engineering or science from a recognized institution, show evidence of ability to pursue and benefit from the program, and fulfill the University of Tennessee Graduate School admission procedures and grade point standards. Subject matter prerequisite to the program includes basic knowledge of computer utilization as represented by Computer Science 3150 or equivalent, a background in statistics as represented by Statistics 3450 or equivalent, a basic understanding of aerodynamic fundamentals, aircraft propulsion and performance as represented by Aerospace Engineering 4110 and 4120 or equivalent, a background in accounting as represented by Accounting 5710 or equivalent basic accounting courses, a basic knowledge of economics as represented by introductory economics or equivalent.

Both thesis and non-thesis programs are available for fulfilling the requirements of the program. The thesis program involves satisfactory completion of the following minimum requirements:

1. Eighteen quarter-hour credits in the major field of aviation systems.
2. For the research and development area, 6 quarter hours in Industrial Engineering 5700 and 5710 and for the administration area, 6 quarter hours in Economics 5070 and Accounting 5810, for a total of 12 quarter hours.
3. Six quarter hours of electives selected from the major field, engineering and/or the areas in item 2.
4. Nine quarter hours in Aviation Systems 5000, Thesis, hence demonstrating the ability to conduct and report on an independent investigation.

The non-thesis program will be permitted in special circumstances and involves satisfactory completion of the following minimum requirements:

1. Eighteen quarter-hour credits in the major field of aviation systems.
2. For the research and development area, 9 quarter hours in Industrial Engineering 5700, 5710, and 5720 and for the administration area, 9 quarter hours in Economics 5070, Accounting 5810 and Finance 5510, for a total of 18 quarter hours.
3. Six quarter hours of electives in one of the areas in item 2.
4. Six quarter hours of electives in the major field, engineering and/or the areas of item 2.
5. Satisfactory completion of 3 quarter hours in Aviation Systems 5100, Project in Aviation Systems.

Courses suitable for credit in the major field include: Aerospace Engineering 5810, Aviation Systems—An Overview; Aerospace Engineering 5820, Air Vehicles; Industrial Engineering 5840, Air Traffic Control Systems; Aviation Systems 5070, Airports and The Community; 5080, Collection and Distribution; 5090, Government Policies for Aviation; 5210, Experimental Flight Mechanics, Performance; 5220, Experimental Flight Mechanics, Stability and Control; 5970, Special Topics in Aviation Systems. Electives typical of those suitable for credit in the area of aviation systems, research and development include: Aerospace Engineering 5150-60-70; Computer Science 3510-20, 4550 and 5655-65-75; Industrial Engineering 4080, 4150, 4230, 5720, 5730, 6700, 6730; Mathematics 4220-30, 4510-20-30; Metallurgical Engineering 5810-20-30; and Statistics 3550.

For the research and development area, 9 quarter hours in Industrial Engineering 5700, 5710, and 5720 and for the administration area, 9 quarter hours in Economics 5070, Accounting 5810 and Finance 5510, for a total of 18 quarter hours.

5000 Thesis

5070 Airports and the Community (3) Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling. Airport management, economics and logistics. Interfaces with the community, collection and distribution, demand and projections. Prereq: Aerospace Engineering 5810.
5080 Collection and Distribution (3) Capacities, technology, plans, programs and developments for collecting and distributing passengers and freight to and from various types of airports. Ground, water, air and mixed transportation modes, present and future; requirements analy-
sis, and models and simulation of the system. Prereq: Aerospace Engineering 5810.

5090 Governmental Policies for Aviation (3) Theoretical and legal basis for economic and governmental regulation of aviation. Historical and legislative development of aviation regula-
tory agencies, organizational structure and administrative and enforcement procedures. Prereq: Aerospace Engineering 5810.

5100 Project in Aviation Systems (3) In-depth study and formal report on aviation systems topic, normally performed during last quarter of work toward degree in non-thesis program. For aviation systems degree candidates only.

5210-20 Experimental Flight Mechanics (3, 3) Flight mechanics, experimental techniques. Specially-equipped airborne laboratory allows active student participation in series of experiments demonstrating acquisition of flight test data. Tests conducted covering broad range of aircraft performance, stability, and control character-
istics. Development of theoretical and laboratory materials to support student experiments. Test techniques, instrumentation and data reduction methods. 5210 emphasis performance, 5220 emphasizes stability and control. Prereq: Aerospace Engi-
neering 4120.

5970 Special Topics in Aviation Systems (3) Current problems in aviation systems. Prereq: Consent of instructor. May be repeated with consent. See also course descriptions for Aerospace Engineering 5610, 5820, and Industrial Engineering 5840.

Ecology

MAJOR

DEGREES

Ecology

M.S., Ph.D.

J. Frank McCormick, Director, Ph.D. Emory

The Graduate Program in Ecology offers Master of Science and Doctor of Philosophy degrees. This
interdepartmental program provides advanced courses in contemporary ecology for students from undergraduate programs in basic and applied biology, social sciences, mathematics and engineering. Opportunities in both fundamental and applied ecology are
intended to prepare students for academic careers as well as professional positions in industry or government. The
Environmental Sciences Division of the Oak Ridge National Laboratory and the
Tennessee Valley Authority provide advisors and research facilities. The Great Smoky Mountains, Cumberland Plateau, valley and ridge topography, TVA lakes and
wild rivers provide locally a spectrum of natural habitats and consequent biological diversity which is truly unique. In this unique environment of changing programs to provide opportunities for student research elsewhere on this continent and abroad.

ADMISSION REQUIREMENTS

Requirements for admission to this program are: (1) admission to the Graduate School; (2) at least 12 quarter hours of college mathematics, and 4 quarter hours of ecology at the upper division level. Candidates for the doctoral degree are expected to take the Graduate Record Examination. Application forms for admission should be obtained from the Graduate School.

Inquiries concerning the admission requirements should be addressed to the
Director, Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee 37916.

ADVISORS

Advisors are selected from ecologists in several departments of the University who have competence in the area in which the student expects to work. Entering students should consult early with the Director of the program on the choice of a faculty advisor. The advisor will become the chairman of the student's faculty committee.

THE MASTER'S PROGRAM

The minimum 45 quarter hours of graduate credit shall include 18 hours of ecology courses (exclusive of thesis), of which 6 hours shall be in Ecology 5210-20-30 and at least 8 additional hours in ecology courses numbered above 5100; 9 hours of thesis in Ecology 5000, and 18 additional hours in ecology or supporting courses. To insure an interdepartmental program, the required minimum 45 hours shall include no more than 18 hours of non-thesis courses from any one department of instruction.

The general requirements for this Master's degree are listed on page 19. A minor in ecology shall include Ecology 5210-20-30 (6 hours) and at least 3 additional hours in approved ecology courses.

THE DOCTORAL PROGRAM

The requirements for this degree are in general the same as those of the Graduate School with the following two exceptions: (1) each student's faculty committee shall consist of at least two members from the department in which the dissertation is being supervised and at least two from outside this department; (2) this doctoral program must include Ecology 5210-20-30 or a minimum of 9 quarter hours of courses numbered above 6000. A student cannot enroll for dissertation until the research proposal has been discussed and approved by the doctoral committee.

Shared Faculty


Courses

The following courses are those offered directly by the Ecology Program and those
which, although listed in other departments, have been approved to satisfy Master's degree requirements.

Additional ecology courses are described elsewhere in the catalog under the
departments identified in the following list.

Agricultural Biology

1010 Biology of Soil Microorganisms (4)

Agricultural Economics and Rural Sociology

4330 Land Economics (3)

5420 Advanced Land Economics (3)

Anthropology

3460 Field Work in Physical Anthropology (3-9)

4640 Zoarcheology (3)

4990 Primate Paleontology (3)

4970 Human Paleontology (4)

5970 Emergence and Early Evolution of Man (3)

Botany

4310 Plant Ecology (4)

5340 Plant Geography (4)

4535 Analysis of Plant Communities (4-5)

4510-20-30 Systems Ecology (3, 3, 3)

5830 Field Methods in Plant Ecology (4)

3630 Ecosystems of the World (3)

Ecology

5000 Thesis

5100 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Maximum 3 hrs.

5210-30 Principles of Ecology (2, 2, 2) Theories and problems in ecology. Comparisons between land, freshwater, and marine environments, including humanity's role in the world's ecosystems. Must be taken in sequence. Prereq: 4 hrs of ecology at the upper division level.

5310 Ecology for Planners and Engineers (3) Ecological principles and effects that human changes have caused on living organisms. Lectures and field trips. F. Schell, Ph.D. In Graduate School of Planning and Environmental Engineering.

5320 Implementation of Environmental Policy (3) Goals and problems of environmental legislation, especially National Environmental Policy Act; purpose, preparation, and evaluation of envi-
ronmental impact statements and similar multidisciplinary studies. Prereq: 5210 or 5310, or Environmental Engineering 4820.

5330 Marine Ecology (4) Relationships of marine organisms to environment and their interactions
with each other. Trophic relationships in neritic, coastal, and estuarine ecosystems; succession; deep-sea ecology; stability. Prereq: One previous ecology course.

5610 Environmental Toxicology (3) (Same as Biochemistry 5610.)

5640 Techniques in Environmental Toxicology (2) (Same as Biochemistry 5640)

6000 Doctoral Research and Dissertation

6100 Special Topics in Ecology (3) Seminars on advanced topics and recent developments in ecology. Prereq: Consent of instructor. May be repeated.

6110 Seminar in Animal Behavior (2)

6120 Seminar in Aquatic Ecology (2)

6130 Seminar in Physiological Ecology (2)

6140 Seminar in Community Ecology (2)

6150 Seminar in Radiation Ecology (2)

6160 Seminar in Systems Ecology (2)

Economics

4260 Economics of Resources and Environmental Policies (3)

Environmental Engineering

4530 Sanitary Engineering Laboratory (3)

4600 Solid Waste Management (3)

4700 Air Pollution-Air Resources Management (3)

5593 Advanced Sanitary Engineering Laboratory (3)

5700 Planning and Air Pollution Control (3)

5710 Air Pollution Control Engineering (3)

Forestry, Wildlife, and Fisheries

4450 Game Mammals (4)

4460 Game Birds (4)

5210 Seminar in Wildlife Conservation (3)

5220 Seminar in Forest Tree Biology (3)

5240 Seminar in Forest Genetics (3)

5480 Predator Ecology (3)

Geography

4720 Data Mapping (4)

4740 Remote Sensing: Types and Applications (4)

5550 Topics in Geography of Land-Surface System (3)

5610 Topics in Climatology (3)

5740 Advanced Topics in Remote Sensing (3)

Geology

4230 Paleoceneology (4)

4240 Paleobotany (4)

4510 Principles of Geomorphology (4)

5290 Quaternary Problems (4)

5915 Regional Geomorphology (4)

Microbiology

5829 Experimental Microbial Ecology (3)

Nuclear Engineering

5210 System Dynamics (3)

Philosophy

4710 Philosophy of Natural Science (4)

5550-60 Philosophy of Science (4, 4)

6550 Seminar in Philosophy of Science (4)

Plant and Soil Science

4320 Soil Formation, Morphology and Classification (4)

5240 Soil Productivity and Management (3)

5250 Pedology (4)

5810 Crop Climatology (4)

5820 Advanced Crop Physiology and Ecology (4)

Psychology

4900 Aspects of Urban Environment (4) SINC only.

5750 Ethological Psychology (3)

Sociology

4110 Population Problems (4)

4330 Urban Ecology (4)

6180 Theory and Method of Human Ecology (3)

Zoology

4200 Ichthyology (5)

4240 Animal Ecology (4)

4660-70 Limnology (4, 4)

4700 Arachnology (4)

5570 Animal Populations (3)

5860 Geographic Distribution of Animals (4)

Industrial and Organizational Psychology

MAJOR

Organizational Psychology

DEGREES

M.S., Ph.D.

Committee:

M. E. Gordon (Chairperson); W. H. Calhoun; F. A. Chamberlain; H. D. Dewar; J. M. Larsen, Jr.; U. M. Lounsbury; J. W. Philpot; M. C. Rush; E. D. Sundstrom; G. H. Whitlock.

(For complete Faculty Listing, see Departments of Management and Psychology)

The Master's and doctoral programs are offered jointly by the Department of Psychology and the Department of Management. They are designed to prepare students for personnel, managerial, and organizational research, for university teaching, and for consulting relationships with industry. The emphasis is upon applied research utilizing a thorough theoretical background, including classical and modern organization theory, organizational behavior, psychology, and management. The programs are administered by a joint committee of the two departments, appointed by the Vice Chancellor for Graduate Studies and Research on recommendations from the two department heads.

It is intended that students entering the program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts. The first-year program provides the opportunity to take courses which will assist the student to attain a reasonable level of sophistication in areas of deficiency (Psychology 5350-60).

ADMISSION PROCEDURE

Applicants for admission should request forms and materials from both the Graduate Office and the Chairperson, Industrial and Organizational Psychology Program, 419 Stokely Center for Management Studies.

Two separate applications must be completed: one application for admission to the Graduate School and one application for admission to the Industrial and Organizational Psychology program.

Deadline: For fall entrance, all materials should be received by the Vice Chancellor for Graduate Studies and Research no later than March 15 if you wish financial assistance consideration. Standards: At least 9 quarter hours of college, mathematics and one course in statistics are required. Ordinarily, an undergraduate grade-point average of 2.5 above is required, with no evidence of special weakness in mathematics and physical sciences.

Test scores on the Graduate Management Admission Test or on each section of the aptitude portion of the GRE must be reported. Customarily, those students admitted to the Program have performed at or above the 63rd to 65th percentile on each portion of these tests. (This corresponds to a raw score of approximately 500 on each of the tests.) The advanced section for psychology (GRE 81) is required of all applicants regardless of whether their scholastic aptitude is assessed with the GRE or GMAT.

THE MASTER'S PROGRAM

I. Course Requirements

A. Management or Psychology 5170, 5180, 5190 (Proseminar in Industrial and Organizational Psychology).

B. Statistics 5050-60-70 (Behavioral Statistics) and 3 hours of applied psychometrics.

C. Eighteen hours of additional course work to be selected primarily from among the 5000-level course offerings in management and psychology (e.g., Management 5110, 5120, 5230; Psychology 5500 (Current Topics in Applied Psychology)).


II. Program Requirements

The Ph.D. program requirements described below in sections II A, II B, and II G comprise the major requirements for a Master's degree. An oral examination covering the thesis and related topics must also be completed.

THE DOCTORAL PROGRAM

I. Course Requirements

A. Minimum course requirements:

1. Management or Psychology 5170,
By the end of nine quarters a student is expected to choose a major advisor (Chairperson of Doctoral Committee).

F. Completion of an oral examination following the preparation of a doctoral dissertation. This examination covers the field of the doctoral research and related topics, and is held at least four weeks prior to the awarding of the degree.

G. Maintenance of at least 3.0 grade point average.

**Management Science**

MAJOR: Management Science

DEGREE: M.S.

**Committee:**

C. E. Bell (Chairperson), Management Science; R. W. Boiling, Management; J. S. Bradley, Mathematics; R. L. Church, Civil Engineering; R. S. Garfinkel, Management Science; E. Gustoff, Economics; R. E. Rosenthal, management Science; S. Seikow, Computer Science; R. E. Sizemore, Finance; C. C. Thigpen, Statistics.

**THE MASTER'S PROGRAM**

The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of management problems in large organizations. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science coursework will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program allows concentrated study in an area of application within the College of Business Administration. With the wide-spread application of management science, the student may (with the approval of the Management Science Committee) choose an applied concentration in a field outside the College of Business Administration. Applications are encouraged from all majors, but mathematical background equivalent to the completion of at least two years of college calculus and proficiency in a computer language (e.g., Computer Science 3150) is required. The program is designed to be completed in one calendar year of full-time study, but applications are encouraged from prospective full-time students.

**Course Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Quarter Hours</th>
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</thead>
<tbody>
<tr>
<td>Management Science 5310-20-30-35-40</td>
<td>14</td>
</tr>
<tr>
<td>Applied concentration area (approved by advisor)</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 5110</td>
<td>3</td>
</tr>
<tr>
<td>Statistics elective (5000 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (4000 level or above)</td>
<td>6</td>
</tr>
<tr>
<td>Electives selected from mathematics, statistics, computer science, and/or management science</td>
<td>6</td>
</tr>
<tr>
<td>Electives in any area approved by advisor</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

A thesis option is available which substitutes 9 hours of thesis credit for the following 14 hours of course work:

Management Science 5335-40, and one 3-hour course in the applied concentration area and 6 hours of electives in any area.

The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee must approve a tentative overall program during the student's first quarter and must approve all courses on a quarter-by-quarter basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. For example, an undergraduate mathematics major with strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirement. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be asked to take such courses to fulfill the 6-hour mathematics requirement. The total course load will remain 50 hours for all non-thesis students and 66 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 18 as a function of prior background.

**Prerequisites for Management Science Courses.**

The Management Science Program is interdisciplinary and students in the other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior coursework does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

For course listings and description of the Ph.D. program in Management Science, refer to the Department of Management Science, College of Business Administration.

**Water Resources Development**

MAJOR: Water Resources Development

DEGREE: M.S.

William F. Brandes, Director, Water Resources Research Center

Specific requirements for admission to this program are a Bachelor's degree in law, engineering, or one of the physical or social sciences from an accredited college or university, and evidence of ability to do work of graduate quality, as ascertained by undergraduate records. Also considered will be prior record, if any, and letters of recommendation. The general policies and requirements of the Graduate School apply to this program.

The degree of M.S. in Water resources Science requires 45 quarter hours of graduate studies, including 9 hours of thesis work. The exact curriculum of each student is decided in consultation with a faculty committee, depending on the student's background and field of interest. If during the undergraduate work the student has, in the opinion of the faculty committee, sufficient training and education in one or
more of the required courses, the student may substitute other elective courses. Electives will consist of advanced work in the student's speciality or in a related field.

3410 Principles of Ground Water Geology (3) (Same as Geology 3410.)
3565 Introduction to Public Administrative Organization and Management (4) (Same as Political Science 3565.)
4110 Managerial Economics (3) (Same as Economics 4110.)
4810 Water Law (3) (Same as Environmental Engineering 4810.)
5000 Thesis
5130 Planning Research Methods I (2) (Same as Planning 5130.)
5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Planning 5160.)
5340 Hydrology of Agricultural and Forest Lands (3) (Same as Agricultural Engineering 5340.)
5410-20-30 Interdisciplinary Seminars (3, 3, 3) Problems relating to comprehensive water resource development; flood management, hydroelectric power, navigation, recreation, alternatives in water resource planning, tomorrow in today's planning, project formulation and justification, direct and indirect economic consequences, state and local participation, and municipal and industrial uses of water developments.
INDEPENDENT STUDY

Certain educational goals may best be met through independent study done by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain the approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

DEPARTMENTS OF INSTRUCTION

Numbers in parentheses following the course titles indicate quarter hours credit offered.

ANTHROPOLOGY

MAJOR

Anthropology

DEGREES

M.A., Ph.D.

Professors:

W. M. Bass (Head), Ph.D. Pennsylvania;
C. H. Faulkner, Ph.D. Indiana; A. K. Guthe,
Ph.D. Michigan; P. W. Parmalee, Ph.D. Texas
A. & M.

Associate Professors:

I. E. Harrison, Ph.D. Syracuse; R. L. Jantz, Ph.D.
Kansas.

Assistant Professors:

A. W. Brittain, Ph.D. Pennsylvania State;
W. E. Klippel, Ph.D. Missouri; M. H. Logan,
Ph.D. Pennsylvania State; R. D. McCracken,
Ph.D. Colorado; G. F. Schroedl, Ph.D.

The Department of Anthropology offers the Master of Arts and the Doctor of Philosophy degrees with concentrations in physical anthropology, cultural anthropology, archaeology, zooarcheology, and folk culture.

THE MASTER'S PROGRAM

The formal requirements for the Master's degree include:

1. A minimum of three quarters of residence at The University of Tennessee, Knoxville.
2. A minimum of 45 quarter hours for graduate credit, including preparation of thesis. Thirty-six of these 45 hours must be in anthropology, 9 hours may be taken in closely related disciplines (at least one-half of the courses must be at the 5000 level).
4. A thesis. In addition to the two (2) copies required by the Graduate School, one bound copy of the thesis is to be presented to the department and one bound copy to the student's thesis advisor.

THE DOCTORAL PROGRAM

Although there is no minimum credit hour requirement for the Ph.D. degree, students in this program should plan to devote to its attainment no less than 3 years beyond the B.A. level and to complete the following requirements:

1. Admission to Ph.D. program through passing the Graduate Evaluation Examination at completion of first year of study, or through departmental acceptance of a previously earned M.A. degree in Anthropology.
2. Formation of an advisory committee and establishment in consultation with that committee of a program of study. Delineation of field(s) of competence by the student and committee and subsequent presentation to graduate advisor.
3. Demonstration of competence in a foreign language as determined by the student's committee.
4. Successful completion of oral and written comprehensive examinations and admission to candidacy.
5. Successful completion of the dissertation and final oral examination.
3070 Genetics and Society (3) (Same as Botany 3070).

3410 Principles of Cultural Anthropology (3) Basic concepts and objectives of cultural phenomena and approaches to its study. Recommended prereq: 2530.

3440 Religion of Primitive Peoples (3) Religions of nonliterate peoples. Place of religion in their social and cultural systems. Recommended prereq: 2530. (Same as Religious Studies 3440.)

3450 Community Studies in Complex Culture (3) Review of cross-cultural comparative urban and village communities and methodologies used in community studies. Recommended prereq: 2530.

3510 Peoples and Cultures of Mainland Asia (3) Ethnographic survey of the indigenous cultures of modern Far Eastern countries. Focus on anthropological perspective. Recommended prereq: 2530.

3530 Peoples and Cultures of Africa (3) Ethnographic survey of the aboriginal cultures of sub-Saharan Africa. Cultural diversity and human ecology in area perspective. Recommended prereq: 2530.

3540 North American Indian (3) An ethnographic survey of cultures of Arctic, Southwest, Plains and Eastern Areas. Emphasis on cultural differences of peoples occupying these areas during pre-European contact and contemporary problems encountered from application of Western models of education among those peoples. Particular attention is paid to American Indians, African tribal groups and Asian cultures. (Same as Curriculum and Instruction 4110.)

3555 Cherokee Ethnohistory (3) Survey of sociopolitical aspects of the United States. Emphasis on organized and planned changes in applied programs. Intensive study of selected case studies. Prereq: 2530 or consent of instructor.

3620 European Prehistory I (3) Cultural development during the Paleolithic, Mesolithic, and Neolithic. Recommended prereq: 2530.

3630 European Prehistory II (3) Cultural development during the metal ages. From the close of Neolithic through Iron Age. Recommended prereq: 2530-2620 and 2630 should be taken in sequence.

3640 Ancient Civilization of Mesoamerica (3) Introduction to archaeology of areas of advanced Indian culture in Mexico and Central America beginning with earliest cultures and proceeding to contact with Europeans. Recommended prereq: 2530.

3660 Prehistory of Tennessee (3) History of archaeological research in Tennessee and survey of prehistoric American Indian cultures identified through research.

3670 Principles of Archaeology (3) Research strategies in archaeological excavation, interpretation, and explanation. Prereq: 2520 or consent of instructor.

3700 Forms of Folklore (4) Introduction to the anthropological study of folklore.

3710 European Folk Cultures (3) Traditional aspects of life, as expressed in technology, beliefs, art, and folklore, under changing historical and socioeconomic conditions.

3800 Language and Culture (3) Relationship between linguistic categories and patterns of culture. Prereq: 2540 or consent of instructor. Recommended: 2530.

3811 Introduction to Museology (3) (Same as Art 3811.)

3900 Human Osteology (4) Intensive examination of the human skeleton. Prereq: 2510 and consent of instructor. 3 hrs and 1 lab.

3920 Principles of Physical Anthropology (3) Survey of materials and methods in physical anthropology. Recommended prereq: 2510.

3930 The Biology of Races of Man (3) Processes of human evolution; racial classification; identification of significant differences among existing stocks; influence of biology and culture in race formation; analysis of racial groups, race mixture, constitution growth and nutrition. Recommended prereq: 2510.

3950 Human Identification (3) Introduction to techniques in identification of human skeletal material. Recommended prereq: 2530.

4110 Education in Cultural Perspective (3) (Same as Curriculum and Instruction 4110.)

4111 Non-Western Education: Anthropological Approaches (3) Analysis of traditional educational practices among non-Western peoples and problems encountered from application of Western models of education among those peoples. Particular attention is paid to American Indians, African tribal groups and Asian cultures. (Same as Curriculum and Instruction 4111.)

4200 Contemporary North American Indian (3) Survey of Indian cultures from initial Euro-American contact to present. Emphasis on intercultural exchange, U.S. Government Indian policy, reservation life. Prereq: 2530 or consent of instructor.

4210 Ethnographic Research Techniques (3) Methodology of ethnographic research and utilizing data. Prereq: Consent of Instructor.

4240 Applied Cultural Anthropology (3) Applications of anthropological theory, methods and findings in programs of community and national development, public health, internationals, and military assistance. Emphasis on the roles of anthropologists, questions of values and ethics in international relations, and of organization and planned changes in applied programs. Intensive analysis of selected case studies. Prereq: 2530.

4250 Medical Anthropology: Lecture (3) A survey of the development of health, disease, treatment, death, and related concepts. Focus on analyzed and described illness and cultural fieldwork.

4259 Medical Anthropology: Laboratory (3) Fieldwork in medical anthropology. Emphasis on cultural aspects of health, disease, treatment, death, and related concepts. Focus on analyzed and described illness and cultural fieldwork.

4330 Readings in Anthropology (1-3) Intensive reading, research, and analysis. Prereq: 2530 or consent of instructor. May be repeated. Maximum 9 hrs.

4340 Field Work in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing of data. Intensive reading. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4360 Field Work in Physical Anthropology (3-9) Practicum in collection and analysis of human biological data. May include either skeletal or living populations. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4400 Cultural Ecology (3) Survey of concepts and methods of cultural ecology and examination of interrelation between cultures and their environments. Topics include ecological theory, methods of analysis, and applications to selected case studies. Prereq: 2530, 2530, 3410 or consent of instructor.

4420 Dynamics of Culture (3) Culture change: innovation, diffusion and acculturation; cultural continuity and stability. Prereq: 2530 or consent of instructor.

4430 Personality and Culture (3) Analysis of relations among individual, society and culture. Application of psychological techniques in cross-cultural studies. Cultural differences and their influence on group behavior. Prereq: 2530 or consent of instructor.

4440 Urban Anthropology (3) Survey of theoretical and methodological issues anthropologists encounter researching cross-cultural urban settlements. Focus is on anthropological perspective and urban problems and planning. Prereq: 3450 or consent of instructor.

4480 Current Trends in Anthropology (3) Analytical and integrative review in symposium of the current debates, research directions, theories, fieldwork methods, and general base. Emphasis on the four subfields of anthropology: archaeology, physical anthropology, linguistics, and cultural anthropology.

4490 Cross-Cultural Survey of Sex Roles and Behavior (3) Examination of sex roles and sex behavior from cross-cultural and diachronic viewpoint. Draws disparate and scattered research together and attempts to arrive at conclusions on questions as to how sex roles are learned, the parameters of acceptable sexual behavior, and degrees of tolerance for sexual deviation in various cultures.

4510 Peoples of China II: Chinese Society After 1839 (3) Anthropological analysis of society and culture in the period of intense Western contact, rejection of the West, and development of modern China. Emphasis on urbanization, society, and culture. Prereq: 2530 or consent of instructor. Recommended: 4500 or an East Asian course.

4550 Indians of the Southeastern United States (3) Survey of Southeastern Indian cultures; emphasis on aboriginal adjustment to environment; relation of Southeastern Indian groups prior to Euro-American contact. Prereq: 2530, 3540 or consent of instructor.

4560 Cherokee Ethnology (3) Intensive survey of ideology and material aspects of Cherokee culture existing at time of contact. Prereq: 2530.

4570 Peoples of Southeast Asia (3) Survey of representative ethnic groups and indigenous cultures of mainland and island Southeast Asia. Prereq: 2530, consent of instructor or an East Asian course.

4580 Asians in the Americas Since 1800: Anthropological Perspectives (3) Character, factors, and motivations in Asian immigration to North, Central and South America. Assimilation pattern and enclave communities are major topics. Major Asian American communities are surveyed.

4590 Peoples of Japan (3) Analysis of the cultural diversity and unity of peoples of Japan. Prereq: 2530 or consent of instructor. Recommended: 2510 or an East Asian course.

4600 Method and Theory in American Archaeology (3) Historical development of New World archaeology with emphasis on theory and field techniques. Prereq: 2520 or consent of instructor.

4610 African Prehistory (3) Survey of cultural history in Africa, south of the Sahara, from earliest evidence of human activity to time of European contact. Prereq: 2520 or consent of instructor.

4640 Zooarchaeology (3) Basic osteological studies of vertebrate classes; emphasis on aboriginal man's utilization of native animals in subsistence and culture. Identification, analysis, and interpretation of archaeologically derived molluscan and vertebrate remains.

4650 Archaeology of Southeastern United States (3) Intensive study of prehistoric American Indian. Special emphasis on Tennessee prehistory. Prereq: 3610 or consent of instructor.


4720 American Folklore (3) Anthropological perspectives on folklore of geographical regions.
and ethnic groups of the United States. Prereq: 3700 or consent of instructor.

4740 Southern Appalachian Folk Culture (4) Research-oriented course dealing with wide range of traditional culture in Southern Appalachia: settlement patterns, folk housing, economic and social organization, dance, and oral traditions and customs. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

4750 Mexican Folklore (3) Anthropological perspectives on folklore of Mexico and Spanish-speaking Southwestern States. Prereq: 3700 or consent of instructor and a reading knowledge of Spanish.

4870 Cherokee Language (3) Linguistic survey of structure of the Cherokee language.

4930 Physical Growth and Constitution (3) Comparative growth patterns throughout the life cycle of man, skeletal and dental maturation; sex differences in growth; human constitutional types. Prereq: 2510 or consent of instructor. Strongly recommended: Biology 2110.

4950 Primate Studies (3) Survey of field and laboratory investigations of comparative anatomy and primate behavior. Prereq: 2510 or consent of instructor.

4960 Primate Paleontology (3) Survey of fossil primate forms; origin and evolution of major primate groups. Recommended: 2510 or consent of instructor.


4975 Laboratory Study of the Mollusca (4) Examination and comparison of skeletons of major faunal studies, guides to identification, methods of presenting faunal data. May be repeated. Maximum 6 hrs.

5000 Thesis

5100 Graduate Research (1-9) Independent investigation of special problems in anthropology.

5101 Seminar in Cultural Anthropology (3-9)

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

5140 Seminar in Zooarchaeology (3) Approaches to analysis and interpretation of archaeological faunal remains. Intensive reading; evaluation and discussion of major faunal studies, guides to identification, methods of presenting faunal data. May be repeated. Maximum 6 hrs.

5149 Laboratory Studies of the Vertebrae Skeleton (4) Examination and comparison of skeletons of major groups of fish, amphibians, reptiles, birds, mammals. Oriented toward identification of archaeologically derived faunal remains. May be repeated. Maximum 6 hrs.

5159 Laboratory Study of the Mollusca (4) Examination and identification of terrestrial and freshwater mollusks of eastern U.S. Emphasis on living and archaeologically derived pelecypods. Prereq: 4640. 1 hr and 3 labs.

5160 Seminar in Archaeology (3-9) Theoretical and practical issues central to contemporary archaeological practice. Consent of instructor. May be repeated. Maximum 9 hrs.

5200 Special Topics in Anthropology (3) Lecture and/or seminar course for advanced students on selected topic of current interest to field of anthropology as a whole. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5210 Community Anthropology: The Local Community (3) Ethical issues, researcher models and research methods on local community. Prereq: 4440 or consent of instructor.

5340 Fieldwork in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing of archaeological material. Prereq: 9 hours of introductory anthropology and consent of instructor. May be repeated. Maximum 9 hrs.

5400 History of Anthropological Theory (3) Theoretical contributions of more influential anthropologists. Prereq: Consent of instructor.

5440 Peasant Societies (3) Critical analysis of existing literature and theories regarding rural-urban polarities, and other factors in intergroup relations between individuals and groups. Prereq: At least one area course.

5460 Quantitative Methods in Anthropology (3) Application of quantitative methods to anthropological data. Correlation and derivative procedures, distance analysis, discriminant analysis, and implementation of computer routines. Prereq: Statistics 2100 or equivalent.

5470 The Healer in Cross-cultural Perspective (3) Graduate seminar dealing with socialization, methods of diagnosis, and therapeutic modes of healers in a range of non-European communities. Prereq: Consent of instructor. Lecture and lab.

5500 Theory in Archaeology (3) Review of development of archaeological theory. Coverage up to and including recent systems approaches.


5620 Problems in Old World Archaeology (3) Selected topics and research problems in European, Asian, and African prehistory investigated in depth. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5630 The Maya (3) Intensive survey of Mayan culture of Yucatan and Guatemala from pre-Columbian times to present. Prereq: 3580.

5640 Archaeological Resource Management (3) Theory and practice—public, conservation, contract, and salvage/research archaeology. Legislation, contracts, responsibilities, and certification; agencies and policies; project design, construction, administration of field work, analysis and publication; archaeology and public; conservation archaeology as career. May be repeated. Maximum 6 hrs.

5660 Seminar in Prehistoric Lithic Technology (3) Analysis of techniques employed in production of prehistoric stone industries; raw materials employed; resultant implements, morphology and function; and typological constructs utilized in archaeological analysis. Prereq: Consent of instructor.

5670 Seminar on Aboriginal Lithic Resources (3) Training and research in stone materials utilized by prehistoric populations—properties, natural occurrence and geographic context, relative abundance and quality extraction and distribution, processing and ultimate forms and functions. Theory and practice of research and resource surveys, discrete regions in terms of lithology and cultural homogeneity, particularly East and Midwest Territories will be explored. Prereq: Permission of instructor.

5680 Theory in Folk Culture Studies (3) Seminar analyzing major theoretical viewpoints of European and American folklore and folk life study trends from inception to present.

5710 Problems in Folk Culture Studies (3) Seminar dealing with selected problems and aspects of traditional behavior in European and American folk culture. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


5910 Measurement of Man (3) Techniques of measuring and describing skeletal material and human subject with emphasis upon practical applications to gnomics, forensic medicine, and engineering. Prereq: Consent of instructor.

5920 Advanced Physical Anthropology (3) Intensive investigation of theory and problems in physical anthropology.

5930 The Human Skeleton in Forensic Medicine (3) Application of physical anthropology to problems in human identification. Determination of age, race and sex of skeleton and preparation of reports for legal medicine. Prereq: 3900.

5940 Skeletal Biology of Early Human Populations (3) Practical and theoretical approaches to analysis of prehistoric human skeletal populations. Demography, vital statistics, pathology, nutrition, and measures of biological relationships as they relate to population as adaptive units. Prereq: 3900.

5945 Comparative Primate Anatomy (4) Laboratory-oriented course dealing with functional significance of primates. Musculoskeletal system and evolution of various primate adaptive patterns. Prereq: Osteology and one dissection course in zoology.

5950 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting human skeletal remains. Recommended prereq: At least one area course.

5960 Dermatoglyphics (3) Methods of dermatoglyphic analysis; genetics and population variation of various dermatoglyphic elements; forensic applications; relationships to genetic and chromosomal abnormalities. Prereq: Consent of instructor.

5970 Emergence and Early Evolution of Man (3) Ancestry and evolutionary significance of Australopithecines. Prereq: 4970 or consent of instructor.

5980 Neanderthal Man and Human Evolution (3) Morphology, distribution and evolutionary relationships of Neandertals. Prereq: 4970 or consent of instructor.

5990 Human Variation (3) Nature of human biological variation with emphasis on microevolutionary processes responsible for establishing human subspecies. Prereq: 4970 or Consent of instructor.

6000 Doctoral Research and Dissertation

6140-20-30 Seminar in Cultural Anthropology (3, 3, 3) Seminar is offered each quarter primarily for doctoral candidates.

6150 Selected Topics in Archaeology (3) May be repeated. Maximum 9 hrs.

6190 Selected Topics in Physical Anthropology (3) May be repeated. Maximum 9 hrs.

6970 Seminar in Human Paleontology (3) Prereq: 4970 or consent of instructor.

Archaeology—Greek and Roman

See Classics
of Art as (1) a minimum enrollment of 6 hours per quarter, and (2) use of Department of Art facilities so that discussion and criticism is available to students. Final examinations are oral, concurrent with project exhibition.

**Curriculum:**

| Major area | 30 |
| Art history | 12 |
| Electives | 10 |
| Seminar in Art Criticism | 4 |
| Total | 90 |

### DEGREE REQUIREMENTS FOR M.F.A.

1. Successful completion of 30 hours of studio in concentration. Inter-area studies must normally be approved by the faculty no later than the third quarter in residence. Fifteen hours of the major must be in second year courses (5155, 5255, 5355, etc.).

2. Twelve hours of art history for graduate credit.

3. Seminar in Art History (4 hours) and Seminar in Art Criticism (4 hours).

4. Ten hours of electives which may consist of any committee-approved combination of graduate credit courses outside the student's departmental concentration.

5. First year evaluation: At the end of the three quarters in residence the student must present work for evaluation by the faculty and receive permission to continue in the program.

6. Second year evaluation: With completion of all course work the student must present work for evaluation by the faculty and receive permission to register for Projects in Lieu of Thesis (Art 5999).

7. Art 5999, Projects in Lieu of Thesis (30 hours) is a third year of semi-independent study.

8. Exhibition and oral examination: With the completion of all requirements for the M.F.A., the student presents the exhibition, and, in the presence of the work, must satisfactorily complete an oral examination.

### GRADUATE MINOR IN THE HISTORY OF ART

A graduate minor in Art History may be arranged with the consent of the student's committee, the instructors involved, and the Graduate School. Prerequisite is an undergraduate Art History minor, or its equivalent, and reading knowledge of French, German, or Italian, unless waived by the art history faculty.

#### 3516 Typography (4)

Theories and techniques of typography and printing as a fine art medium. May be repeated. Maximum 12 hrs.

#### 3517 Airbrush (4)

Techniques and creative applications. May be repeated. Maximum 8 hrs. For art majors only.

#### 3704 History of Medieval Art (4)


#### 3705 Northern European Painting: 1350-1600 (4)

Painting and printmaking of Low countries, France, Germany, and England. Includes inter-national style manuscripts, Van Eyck, Bosch, Durer, Holbein, and Bruegel.

#### 3715 Early Italian Renaissance Art: 1300-1500 (4)

Painting, sculpture, architecture includes Giotto, Masaccio, Donatello, Brunelleschi, Alberti, Botticelli, and Leonardo.

#### 3716 Art in Southern Europe and New World in Sixteenth Century (4)


#### 3725 Art of Southern Europe and New World in Seventeenth and Eighteenth Centuries (4)


#### 3726 Art of Northern Europe in Seventeenth and Eighteenth Centuries (4)


#### 3735 History of Nineteenth-century Painting in Europe and America (4)

Fauvism, Post Impressionism, Symbolism, and Surrealism. In Europe; Post Impressionism in France; Neo-Impressionism, Fauvism, Post Impressionism, Cubism, Futurism, Dada and Surrealism, geometric abstraction, social commentary painting, Abstract Expressionism in the U.S.A. and parallels in Europe; Pop, Op, Minimal, and Concept Art.

#### 3745 History of Modern Architecture in Europe and America (4)

Survey of nineteenth century styles, Sullivan and Wright, American Modern in France; Frank Lloyd Wright, Mies van der Rohe, Le Corbusier, and Wright. Aalto to Kahn, Tange and Metabolism, Archigram, Soleri, and Venturi.

#### 3746 History of Modern Sculpture in Europe and America (4)

From 1800 to 1900: Neoclassicism to cubism. From 1900 to present: emphasis on Cubism, Constructivism, Expressionism, Assemblage, Pop, Primary Forms, Environments, and Earthworks.

#### 3755 History of North American Art (4)

Survey of Inuit, Native American, Romanesque, Gothic, and Concept Art.

#### 3756 History of Twentieth-century American Art (4)

Analysis of developments in architecture, painting, sculpture, and design from prehistory to 1900.

#### 3757 Art of Indian Asia (4)

History of Indian art with consideration of art of Central Asia and Southeast Asia.

#### 3776 Chinese Art (4)

#### 3777 Japanese Art (4)

#### 3811 Introduction to Museology (5)

Concepts, practices and historical development of museums of art, archaeology, anthropology and science. (Same as Anthropology 3811)

#### 3935 Film Design (4)

Theory and practice of film making.

#### 4015 Individual Problems (4)

Prereg: Consent of instructor. May be repeated. Maximum 12 hrs.

#### 4106 Special Topics in Drawing (4)

4. Student- or instructor-initiated course offered at convenience of Department. Prereg: Determined by department. May be repeated. Maximum 16 hrs.

#### 4115 Drawing IV (4)

Prereg: 12 hrs of 3115. May be repeated. Maximum 12 hrs.

#### 4206 Special Topics in Painting (4)

4. Student- or instructor-initiated course offered at conveni-
ence of department. Prereq: Determined by department. May be repeated. Maximum 18 hrs.
4215 Painting IV (4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
4315 Watercolor IV (4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
4406 Special Topics in Sculpture (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 18 hrs.
4415 Sculpture IV (4) May be repeated. Maximum 12 hrs.
4506 Special Topics in Communication Design (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 18 hrs.
4545 Visual Communications Seminar (2) Political, social, economic, and moral problems of contemporary designer. Prereq: 4515.
4606 Special Topics in Printmaking (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 18 hrs.
4615 Intaglio IV (4) May be repeated. Maximum 12 hrs.
4616 Lithography IV (4) May be repeated. Maximum 12 hrs.
4617 Advanced Screen Printing (4) May be repeated. Maximum 12 hrs.
4855 Studies in Art History (2) Concentration in selected areas. Prereq: 16 hrs of art history and consent of instructor. May be repeated. Maximum 6 hrs.
5000 Thesis
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward graduate requirements. May be repeated. S/J/N only.
5011-21.31 Exhibition in Lieu of Thesis (3, 3, 3)
5101 Foreign Study (1-12) See page 100.
5102 Off-campus Study (1-12) See page 100.
5103 Independent Study (1-12) See page 100.
5115 Graduate Drawing I (2-6) May be repeated. Maximum 18 hrs.
  *5155 Graduate Drawing II (2-6) May be repeated. Maximum 18 hrs.
5215 Graduate Painting I (2-6) May be repeated. Maximum 18 hrs.
  *5255 Graduate Painting II (2-6) May be repeated. Maximum 18 hrs.
5315 Graduate Watercolor I (2-6) May be repeated. Maximum 18 hrs.
  *5355 Graduate Watercolor II (2-6) May be repeated. Maximum 18 hrs.
5415 Graduate Sculpture I (2-8) May be repeated. Maximum 18 hrs.
  *5455 Graduate Sculpture II (2-8) May be repeated. Maximum 18 hrs.
5515 Graduate Communication Design I (2-6) May be repeated. Maximum 18 hrs.
  *5555 Graduate Communication Design II (2-6) May be repeated. Maximum 18 hrs.
5615 Graduate Printmaking-Lithography I (2-6) May be repeated. Maximum 18 hrs.
5616 Graduate Printmaking-Intaglio I (2-6) May be repeated. Maximum 18 hrs.
5617 Graduate Printmaking-Screen Printing I (2-6) May be repeated. Maximum 18 hrs.
  *5655 Graduate Printmaking-Lithography II (2-6) May be repeated. Maximum 18 hrs.
  *5656 Graduate Printmaking-Intaglio II (2-6) Individual problems with etching and engraving. May be repeated. Maximum 18 hrs.
  *5657 Graduate Printmaking-Screen Printing II (2-6) May be repeated. Maximum 18 hrs.
5770 Seminar in Art History (4)
5900 Seminar in Art Criticism (4) Theory and practice. Intended for majors in studio art.
5955 Reading and Research in Art History (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
5999 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by the graduate faculty. May be repeated. Maximum 18 hrs.
  *Graduate II courses must be preceded by successful first year evaluation by the faculty.

**Audiology and Speech Pathology**

**MAJORS**

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**Professors:**
- H. L. Luper (Head), Ph.D., Ohio State; S. Adler, Ph.D., Ohio State; C. W. Asp, Ph.D., Ohio State; P. J. Carney, Ph.D., Iowa; D. M. Linscomb, Ph.D., Washington; I. Nabelek, Sc.D., Prague; H. A. Patterson, Ph.D., Illinois; B. Silverstein, Ph.D., Purdue.

**Associate Professors:**
- S. B. Burchfield, Ph.D., Michigan State; C. G. Maisel, M.Ed., Texas; H. L. Witter, Ph.D., Purdue.

**Assistant Professors:**
- W. M. Collins, Ph.D., Missouri; T. O. Colwell, M.A., Tennessee; E. Ireland, Ph.D., Iowa.

**THE MASTER’S PROGRAM**

A major is offered in Audiology or in Speech Pathology. A minor is offered in each of the two areas when approved by the department.

The intent of each major program is to provide the student with the scholarly and professional skills necessary for functioning as an independent professional clinician in any clinical environment. Within this broad coverage of speech pathology or audiology, it is possible for a student to specialize to some extent. For example, in the M.A. in Audiology program, a student may emphasize audiological assessment, aural habilitation, rehabilitation, medical or pediatric, or industrial audiology. Within the M.A. in the Speech Pathology program, a student may emphasize language disorders, aural habilitation, or speech disorders such as aphasia or stuttering. Students interested in specializing beyond the typical broad M.A. program should consult the department office or their advisor for lists of suggested courses, practica and independent studies.

Students majoring in the two areas are expected to complete the academic requirements for clinical certification from the American Speech and Hearing Association, including the required number of clock hours of clinical practicum. An exception to this rule must be approved by the Department Curriculum Committee. Enrollment in clinical practicum courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient course work in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students may elect either the thesis program or the non-thesis option. Students in both programs are required to take 5110 and 5119. The Master’s program with the thesis will include a minimum of 45 quarter hours of approved graduate credit, including 9 quarter hours of 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least one-half of these total courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. A minimum of 24 quarter hours must be at the 5000 or 6000 level. The decision as to choice of the thesis or non-thesis program is normally made following completion of 5110 and a conference with the student’s advisor.

**THE DOCTORAL PROGRAM**

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for research or college teaching careers in the field of speech and language pathology, audiology, or speech and hearing science. This degree program is research oriented, with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study important questions concerning the human act of oral and aural communication. Students will be expected to master the accumulated knowledge in the areas of:

1. Basic speech, hearing and language processes;
2. Speech, hearing and language disorders;
3. Related disciplines providing insight into human communication processes;
4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

The program will normally consist of three or more calendar years of graduate study beyond the Master’s degree with the first year being devoted primarily to formal course work and the last year to full-time research culminating in the doctoral dissertation. Specific program requirements of study will be determined by the student in consultation with his/her faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philosophy in
5460 Differential Diagnosis of Auditory Disorders (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 4720.

5470 Impedance Measurement in Audiology (3) Theoretical and practical considerations behind emerging use of impedance measurement in clinical measurement of hearing. Practical experience in using several impedance measuring devices. Prereq: 3010, 4720, 5710 or consent of instructor.

5490 Practicum in Hearing Conservation (1-6) Supervised on-site experience in hearing conservation programs at industrial settings. Prereq: 4760, 5040. May be repeated. Maximum 6 hrs. S/N/NC only.

5500 Seminar in Audiology (3) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

5503 Seminar in Advanced Audiological Procedures (3) Theoretical and practical considerations of auditory procedures used for differentiating between cochlear vs. retrocochlear auditory lesions, identifying central auditory lesions, and severity of hearing loss.

5504 Special Problems in Audiology (1-6) Prereq: 4720 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs.

5520 Seminar in Speech Pathology (3) Current significant research in speech pathology. Topics vary from quarter to quarter. Prereq: 12 hrs in speech pathology. May be repeated with consent of department. Maximum 12 hrs.

5540 Seminar in Language Pathology (3) Nature, etiology and treatment of retarded language development in children. Prereq: 3310. (Same as Special Education 5540.)

5555 Special Problems in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5560 Independent Study in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5580 Independent Study in Audiology (1-6) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs.

5610 Practicum: Language Pathology in Children (3) Seminar and or practicum involving discussion of various tools and analysis of habilitative philosophies, specialties and techniques. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5651 Seminar in Language Differences (3) Significant research relevant to language differences of culturally different children.

5730 Seminar in Medical Audiology (3) Advanced study of auditory disorders commonly encountered by medical environment. Etiology, pathology and evative procedures to differentiate lesions of auditory mechanism. Field trips may be required. Prereq: 4720 or equivalent.

5740 Seminar in Pediatric Audiology (3) Advanced study of theoretical and practical considerations of procedures to evaluate hearing of infants and small children. Prereq: 4720 or equivalent.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) Psycholinguistic concepts and information theory in studying the normal acquisition of language and certain disabilities of language. Prereq: 3200, Psychology 3210 or equivalent. (Same as Psychology 5790.)

5850 The Verbo-Tonal System (3) Theory, procedures and instrumentation of Verbo-Tonal System in habilitation, rehabilitation, diagnosis, speech therapy, and foreign languages. Prereq: 3710. Recommended: 4850 and phonetics.

5860 Doctoral Research and Dissertation

6000 Experimental Phonetics (3) Acoustical and physiological analyses of speech production and perception. Prereq: 5110 or consent of instructor.

6010 Experimental Phonetics Laboratory (2) Must be taken concurrently with 6010.

6020 Psychoacoustics (3) Auditory reception and perception of nonspeech stimuli. Prereq: 6010.

6029 Psychoacoustics Laboratory (2) Must be taken concurrently with 6020.

6060 Applied Anatomy and Physiology of Speech Mechanism (3) Dissection and related readings. Prereq: 5060 or equivalent.

6089 Laboratory in Applied Anatomy & Physiology of Speech Mechanism (2) Must be taken concurrently with 6060.

6080 Seminar in Speech Science (3) Advanced study of experimental areas such as speech physiology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement of speech and language. Topics vary from quarter to quarter. Prereq: 6010 or consent of instructor. May be repeated. Maximum 9 hrs.

6090 Seminar in Hearing Science (3) Advanced study of perception of nonspeech acoustic signal; detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 6020 or consent of instructor. May be repeated. Maximum 9 hrs.

6100 Experimental Design in Speech and Hearing Science (3) Analysis of experimental design in theses and related journals. Psychophysical methods for data acquisition. Generation of experimental designs based on parametric and nonparametric statistics. Prereq: 5110 or equivalent and consent of instructor.

6117 Theories of Hearing (3) Physiological processes basic to classical theories of hearing related to sensitivity; loudness; pitch; and discrimination of acoustic stimuli. Prereq: 5070 or consent of instructor.

6119 Advanced Instrumentation in Speech and Hearing Science (3) Selection, use and calibration of instrumentation used in speech and hearing research. Prereq: 5117, 5119 or equivalent.

6500 Advanced Seminar in Audiology (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6550 Advanced Seminar in Speech and Language (3) Topics vary from quarter to quarter but include advanced study of aberrations of voice, articulation, speaking time and rhythm, language development or use, and language symbolization. Prereq: Consent of instructor. May be repeated.

6560 Directed Research (1-6) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

6570 Directed Study in Speech Pathology (1-3) May be repeated. Maximum 9 hrs.

6580 Directed Study in Audiology (1-3) May be repeated. Maximum 9 hrs.

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 9 hrs.

6600 Directed Study in Hearing Science (1-3) May be repeated. Maximum 9 hrs.

6710 Research in Audiology (1-9) depends on quarter of availability. Prereq: 6010 or consent of instructor.
Infrared and Raman Spectroscopy (Physics 5440), Radiation Chemistry (Physics 4200-20-30), Advanced Thermodynamics and Statistical Mechanics (Physics 5110-20-30); plus minimum of three quarters of approved physical chemistry (e.g., Biochemistry 4210-20-30, Chemistry 3410-20-30) and at least 18 hours of biology beyond the introductory level including at least 3 hours of genetics and 3 hours of physiology. At least 3 hours must be graduate credit in an approved area of specialization which should be identified early so that necessary prerequisites can be taken.

2. Participation in Biochemistry 6410-20-30 and in the advanced biochemistry seminars during the entire period of residence.

4. Preliminary examinations are administered preferably at the beginning of the fall quarter of the student's third year and are designed to test in comprehensive fashion the mastery of the required formal course work listed in items 1 and 2.

5. A dissertation reporting the results of original research that was carried out during the term of candidacy.

6. A final examination which will be concerned primarily with the student's dissertation.

Petition for Master's Degree: Students who have passed the preliminary examination in the Ph.D. program may petition the department for award of a Master's degree. The additional requirements for such a degree shall be:

(a) the completion of at least 45 hours of approved course work for graduate credit, at least half of which must be at or above the 5000 level;

(b) the preparation of a research manuscript suitable for submission for publication in a major scientific journal;

(c) the oral defense of that manuscript before an ad hoc committee of the faculty members appointed by the head of the department, at least two of whom shall be members of the department.

4110-20 Cellular and Comparative Biochemistry (4, 4) Electrolyte behavior; chemistry and structure of proteins; enzyme behavior and biological function; catalysis and energy capture; synthetic metabolism; nucleic acid function, protein synthesis and biochemical genetics; regulation of biological processes. Must be taken in sequence. Prereq: Chemistry 3211-21-31, 5220, 5310-20-30.

4119 Cellular and Comparative Biochemistry Laboratory (2) Basic biochemical procedures of general application in biochemistry and molecular biology. Prereq: 1 quarter of analytical chemistry. Prereq or coreq: 4110.

4210-20 Introduction to Physical Biochemistry (3) Physical chemistry of macromolecules: polarized light, absorption and fluorescence, sedimentation and transport hydrodynamics, electron paramagnetic resonance, and structural x-ray crystallography of proteins and nucleic acids. Prereq: Chemistry 3430, or equivalent.

5000 Thesis

5010 Biochemical Techniques (2) Theory and laboratory practice in sedimentation, chromatographic and electrophoretic techniques in isolation and characterization of macromolecules of importance in biology and molecular biology. Prereq: 4119 or equivalent. Open to undergraduates with consent of department.


5120 Membranes, Compartments, and the Regulation of Energy Metabolism (3) Examination of metabolic pathways for electron transport, oxidative phosphorylation, and lipid synthesis, storage, and degradation, and of intracellular and interorgan compartmentalization and phenomena of permeation which make possible biological control of these pathways. Prereq: 4110-20.

5130 Protein Structure and Enzyme Function (3) Physical chemical properties of proteins; primary, secondary, tertiary and quaternary structure; denaturation, renaturation and other conformational change; structure-function correlations; enzyme-specific models of catalysis; steady-state, transient, relaxation, and allosteric kinetics of catalysis. Prereq: 4110 and either 4220 or Chemistry 3430.

5220 Structures and Functions of the Nucleic Acids (3) Chemistry of nucleic acids; hydrogen bonding and double-stranded structures; collision, supercoiling; and order-strucure and environment considerations; biosynthesis of DNAs and RNAs; repair mechanisms; degrading mechanisms; mechanisms of genetic information storage and retrieval. Prereq: 4110-20 or equivalent.

5230 Protein Synthesis and Its Role in Metabolic Regulation (3) Mechanism of assembly of peptide chains; ribosome structure and function; deciphering and genetic code; regulation of transcriptional and translational events (induction, repression, etc.). Prereq: 4110-20.

5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs.

5310-20-30 Experimental Techniques (2, 2, 3) Tutorial laboratory course in modern experimental methodology and instrumentation. Prereq or coreq: 4110-20-30.

5450 Special Topics (1-3) Registration only by prior arrangement with department. May be repeated. Maximum 12 hrs.

5510 Properties of Biomolecules Related to Function (3) Structures, chemical and physical properties of biomolecules developed from theoretical and experimental points of view to explain actions and interactions. Prereq. Chemistry 3211-21-31; Chemistry 2140 recommended. Prereq or coreq: 4210, Chemistry 4910 or equivalent.

5520 Molecular and Cellular Basis of Metabolic Regulation (3) Physical chemical properties of metabolic pathways dependent on energy demands of organism and on synthesis of macromolecular precursors. Prereq: 5510 or consent of department. Coreq: 4220 or Chemistry 4920 or equivalent.

5530 Biosynthesis and Regulatory Functions of Informational Molecules (3) DNA, RNA, and Proteins: Physical chemistry, synthesis, transcription, and metabolic regulation. Prereq: 5520, Coreq: 4230.

5610 Environmental Toxicology (3) Basic concepts in toxicology, interactions at subcellular, cellular, organ, organismal, population, and environmental levels, legal aspects. Major emphasis on biochemical toxicology. Prereq: 4110-20, Chemistry 3211-21-31, Chemistry 4910-20-30, or consent of instructor. (Same as Ecology 5610.)

5640 Techniques in Environmental Toxicology (2) Survey of experimental, biochemical, and bioassay methods employed in toxicological studies. Prereq: Chemistry 2140-2149 and 3211-21-31, 1 yr of physics; or consent of instructor. (Same as Ecology 5640.)

6000 Doctoral Research and Dissertation

6010 Advanced Biochemistry Seminar (1) Topics to be covered in a research seminar. (Same as Biochemistry 6410-20-30.) Current Topics in Biochemistry, (2, 2) Seminars and lectures dealing with current advances in field of chemical biology. May be repeated with consent of department. S/N only.

6450 Advanced Special Topics (1-3) Registration only by prior arrangement with department. For students who have passed Ph.D. preliminary examination or are in advanced state of graduate studies. Topic title posted in advance. May be repeated. Maximum 9 hrs.

Biology

MAJOR

BIOCHEMISTRY

The Master of Arts in College Teaching program is administered by an interdepartmental committee composed of one representative from each of the following departments: Biochemistry, Botany, Microbiology and Zoology. Inquiries regarding the program should be addressed to the chairperson of the committee.

The admission requirements are:

1. Bachelor's degree with satisfactory record.

2. Nine quarter hours of college mathematics.

3. Twelve quarter hours of physical sciences.

4. Twelve quarter hours of general biology, general botany, or general zoology.

5. Eighteen quarter hours of advanced biology courses.

Requirements for the degree: All candidates for the MACT degree in Biology will meet a minimum distribution of graduate and undergraduate courses as follows:

1. Eight quarter hours in each of the following:
   a. Taxonomy and/or Ecology.
   b. Morphology, Developmental Biology and/or Anatomy.
   c. Physiology and/or Biochemistry.
   d. Genetics, Cytology and/or Cytogenetics.

2. Eighteen quarter hours of advanced biology credit in one of two of the following four fields: biochemistry, botany, microbiology, zoology or 36 quarter hours of advanced courses along the four fields as specified by the interdepartmental committee administering the MACT program in Biology.
3. At least 21 quarter hours of course work in requirement 2 (not including special projects and thesis) numbered at the 5000 or 6000 level.

4. At least 18 quarter hours of Master’s research and an acceptable thesis.

5. Total graduate credit in the biological sciences (or appropriate supporting fields) of 57 quarter hours (including that in items 1, 2, 3, and 4).

6. A three-quarter, 1-hour seminar (or seminar series) on the problems and techniques of college teaching.

7. Six quarters of part-time, supervised college-teacher-internship training.

8. A final comprehensive oral examination covering the thesis endeavor and the subject matter of the course requirements.

Botany

MAJOR DEGREES

Botany M.S., Ph.D.

Professors:
W. H. Holton (Head), Ph.D. Michigan; E. E. Cieslbach, Ph.D. Duke; H. R. DeSelm, Ph.D. Ohio State; V. P. Gannett, Ph.D. Vanderbilt; L. W. Jones, Ph.D. Texas; J. F. Mccormick, Ph.D. Emory; F. H. Norris, Ph.D. Ohio State; J. S. Olson, Ph.D. Chicago; R. H. Petersen, Ph.D. Columbia; A. J. Sharp (Emeritus), Ph.D. Ohio State; P. L. Malone, Ph.D. Texas.

Associate Professors:
C. C. Amundson, Ph.D. Colorado; M. W. Berndt, Ph.D. Texas; J. D. Caponetti, Ph.D. Harvard; M. E. Evans, Ph.D. Michigan; A. S. Heiman, Ph.D. Ohio State; H. H. Shogart, Ph.D. Georgia.

Assistant Professors:

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, mycology, cytology, cytogenetics, ecology, genetics, lichenology, mycology, physiology, phycology, pedology, and taxonomy.

Requirements for admission: In addition to the general Graduate School requirements, the botany department also strongly recommends submitting a statement of purpose and advanced scores from the Graduate Record Examinations, at least three letters of recommendation from academic or professional persons, a short statement describing probable areas of interest in botany, and the following specific courses: (1) general botany or biology 12 quarter hours; (2) advanced botany or closely allied biological sciences, 18 quarter hours; (3) physical sciences; general inorganic chemistry, 12 quarter hours, organic chemistry and physics highly recommended; (4) college mathematics, 9 quarter hours.

General degree requirements are given on pages 19-24. Special departmental requirements include successful completion of the following:

THE MASTER’S PROGRAM

A. Thesis Program

1. Satisfactory preparation of a written formulation and an oral defense to the student’s committee of a research proposal suitable for a dissertation problem. Must be completed before enrollment in Botany 5000.

2. Satisfactory performance on an examination in one modern foreign language (French 3000 or German 3030) and botanical science 5030 (or equivalent).

3. Satisfactory completion of 2 credit hours at the 6000 level.


5. Presentation of a thirty-minute departmental seminar.

6. Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

7. Satisfactory performance on a final written examination in all work offered for the degree. The department may or may not follow this examination with an oral examination.

THE DOCTORAL PROGRAM

1. Satisfactory presentation of a written formulation and oral defense to the student’s committee of a research proposal suitable for a dissertation problem. Must be completed before enrollment in Botany 5000.

2. Satisfactory performance on an examination in one modern foreign language (French 3000 or German 3030).

3. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation).


5. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation).

6. Presentation of a one-hour seminar departmental seminar near the end of the doctoral program.

7. Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

*Note: Graduate School requirements are denoted by an asterisk. These requirements should be interpreted as minimal requirements and specific stipulations or requirements such as additional foreign languages, additional oral preliminary examinations may be required by the individual student’s faculty committee.

**3910-20 Plants in Evolution (4, 4) Monera to Archaeplasmata. emphasis on evolutionary relationships, morphology and development. Prereq: 6 hrs in biological sciences.

**3930 Field Botany (4) Study of plants in natural environments and the identification of plant identification, collection, preservation and basic ecological concepts. Prereq: 6 hrs in biological sciences.

3031-32 Field Botany (4, 4) Emphasis on fall and winter flora respectively. Prereq: 3030. Need not be taken in sequence.

**3950 Socioeconomic Impact of Plants (3) Significance of plants in origin and development of human cultures, evolution of cultivated plants, and role of plants in present civilizations. Occasional field trips.

**3970 Genetics and Society (3) An introduction to genetics, anthropology and evolution with emphasis on their implications for human society. (Same as Anthropology 3070.)

**3990 Biology and Human Affairs (3) Basic biological principles involved in deterioration and preservation of an environment in which human cultures may survive.

3130 Introductory Plant Pathology (4) (Same as Agricultural Biology 3130.)

**3210 Introductory Plant Physiology (4) Organismal physiology of plants; water relations, mineral nutrition, morphogenesis, elements of metabolic processes, effects of age, light, natural rhythms, temperature and other environmental factors. Prereq: 1 yr general chemistry and 1 yr biological science.

4039 Mechanisms of Plant Speciation (4) Processes of plant speciation emphasizing population genetics, isolation, drift, hybridization, variation in populations, establishment of population barriers and other aspects of plant speciation. Prereq: 3010-20 and Biology 3110.


4240 Paleobotany (4) (Same as Geology 4240.)

4310 Plant Ecology (4) Interactions between individuals, species, communities, and their environments. Calculation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq: 3030 or equivalent.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5003-04 Non-Thesis Research (3, 3) Library, field or laboratory research under supervision of staff members. Not for thesis candidates.

5011 Mycology (4) Intensive survey of fungi, including all major classes, utilizing lecture, laboratory, and field information. Occasional field trips. Prereq: 3010. 3 hrs and 1 lab.

5012 Morphology and Evolution of the Phycomycetes (4) Similar to 5000, but dealing with Phycomycetes fungi. Prereq: 5011 or consent of instructor.

5017 Field Mycology (4) Intensive summer course on field techniques and morphology of higher fungi. Frequent field trips. Prereq: Consent of instructor. May be repeated.

*Not for graduate credit for botany majors.
5021 Bryology (4) Taxonomy, phycology, ecol-, phyology, and developmental morphology of bryophytes with emphasis on field studies and current research. Prereq: 3020. 1 hr and 3 labs.

5022 Lichenology (4) Taxonomy, phycology, ecol-, phyology, economics and symbology of lichens with emphasis on field studies and current research. Prereq: 3010, 5011 or 5017. Recommended: 5061. 1 hr and 2 labs.

5031 Vascular Plant Taxonomy (4) Family charac- teristics of vascular plants, including principles of phycology and classification, based primarily on plants of local flora. Prereq: 3530 or equivalent. 2 hrs and 2 labs.

5065 Phytoplankton Ecology (4) Interaction be- tween environment and phytoplankton. Nutrient uptake, primary and secondary production, competition, ecolog- ical theory applied to phytoplankton communities, and physiological adaptations by popula- tions in the environment. Prereq: 3010 or consent of instructor.

5070 Principles of Biological Illustration (3) Prin- ciples and application of photography, including photomicrography and photomacroraphy, draw- ing graphics, and other methods for recording and presentation for research and publication of data in pictorial or graphic form. 1 hr and 2 labs.

5080 Photobiology (4) Evolutionary study of lower vascular plants: morphology, cytology, ecology, life cycles and classification. Biosystematic studies and recognition of local species. Prereq: 3020 or consent of instructor. 2 hrs and 2 labs or field trips.

5090 Morphology and Evolution of Basidiomy- cetes (4) Structure and function of somatic and reproductive structures of higher fungi as applied to evolution in group. Cultures and specimens in laboratory. Prereq: 3010 or equivalent.

5120 Agrostology (4) Collection, identification, classification, and phylogeny of tribes of grasses. Prereq: 3030 or consent of instructor. 2 hrs and 2 labs.

5150 Advanced Morphology of Flowering Plants (4) Vegetative and reproductive organs: morphology, cytology, embryology, ontogeny, mechanism, mechanisms, and development. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs.

5160 Biosystematics (4) Major experimental methods used in systematics and application to spe- cific types of systematic problems. Cytotax- onomy, numerical taxononomy, and chemotaxon- omy. Prereq: Consent of Instructor.


5220 Advanced Plant Physiology II (3) Growth and differentiation of plants at molecular, cellu- lar, and organismic levels. Chemical regulation of development; macromolecular expression of differentiation; photosynthesis and endo- genous rhythms; dormancy; germination; flower- ing and senescence. Prereq: 5210 or Biochemistry 5230.

5230 Qisiemany Problems (4) (Same as Zoology 5250.)

5310-20-30 Special Problems in Botany (1-4, 1-4, 1-4)

5340 Plant Geography (4) Distribution of ecosys- tems with emphasis on African types. Vegeta- tion, climate, and historical aspects. Prereq: 4310. 2 hrs and 2 labs.

5350 Analysis of Plant Communities (4) Plants as species and ecosystems components consid- ered from the viewpoint of ecology, ordination, and ecosystem function. Prereq: 4310. 2 hrs and 2 periods (field trips).

5410-20-30 Seminar in the Teaching of College Botany (1, 1, 1) Teacher training in the teaching of gen- eral botany. Supervised teaching in general seminar; techniques in testing, con- cepts, and laboratory supervision by assistants. Prereq: Consent of Instructor. S/NC only.

5440 Seminar in Botany (1) Readings and dis- cussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 12 hrs. S/NC only.


5561 Phycology (4) Intensive, comparative study of major divisions of algae, both freshwater and marine. Taxonomical, ecological, morphological, developmental, and evolutionary aspects. Field and laboratory studies, identification and classi- fication, introduction to experimental phycology. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs.

5780 Plant Cytology (4) Intensive consideration of cellular structure and function, with emphasis on correlation where possible of ultrastructure, biochemistry and function of sub- cellular organelles. Principles and application of various analytical and electron microscopic tech- niques, cell fractionation and isolation of sub- cellular components; differentiation and analyti- cal centrifugation: photomicrography and microcinematography. Intended for graduate students in the biological sciences. 2 hrs and 2 labs.

5810 Cytogenetics (4) Changes in chromosomes and genes with relation to mutations, hybridiza- tion, speciation, and phylogeny. Prereq: Biology 3110; 5780, or Zoology 4310. 2 hrs and 2 labs.

5820-20-22-23-24-25 Methods and Instrumentation in Laboratory Investigation (1, 1, 1, 1, 1) Laboratory course providing project experience and theo- retical background in one research methods: ion-exchange resins, adsorption spectrometry, dialysis, gel filtration, paper electrophoresis, polyacrylamide and ul- tranrifugation, gel chromatography, automatic analyzers, microscopy, culture methods, use and detection of radioisotopes, and others.

5830 Field Methods in Plant Ecology (4) Analysis of plant communities and environments, including field experience. Prereq: 4310, 5340, 5530. 2 hrs and 2 periods (field trips).

5850-51-52-53-54 Methods and Instrumentation in Field Investigations (1, 1, 1, 1, 1) Intensive field work using appropriate methods and instrumen- tation. Topics vary according to needs of stu- dents. Prereq: Be repeated with consent of instruc- tor. S/NC only.

5870 Experimental Plant Genetics (4) Genetics of plants stressing molecular aspects and includ- ing mechanisms of gene action, control ele- ments, translocations, polygenes, cytogenetics, and adaptation. Prereq: Biology 3110 and Chem- istry 3231. 3 hrs and 1 lab.

5910-20 Developmental Plant Morphology (3, 1) Development in plants with emphasis on as- pect of phenomena of morphogenesis-correla- tions, polarity, symmetry, differentiation, regener- ation, the adaptive response, and the roles of the plant in the environment. May be repeated with consent of instructor.

6000 Doctoral Research and Dissertation

6010 Advanced Topics in Morphology of Vascular Plants (2-4) Needs of students determine con- tent. Topics selected from current research on developmental morphology of experimental anatomy, morphology, and morpho- genesis. Prereq: 3020-30, 4120, 5910-20 or con- sent of instructor. Prereq: 5910. 5920-30. May be repeated with consent of department.

6100 Advanced Topics in Cryptogamic Botany (2-4) Advanced studies and current research in experimental phylogeny, mycology, cryptogamy, or developmental morphology of cryptogams. May be repeated with consent of department.


6420 Advanced Topics in Genetics (2-4) Literature survey of selected areas of genetics. Prereq: Biology 3110; Biology 4110-20. May be repeated with consent.

6520 Seminar in the History of Botany (2)

6520 Advanced Topics in Plant Physiology (4) Requirements of student determine content, in- cluding growth and growth hormones; minor ele- ment nutrition; photosynthesis; radiation ef- fects. Prereq: 5210; 1 yr college physics may be repeated with consent.

6530 Advanced Topics in Ecology (2-4) Needs of student determine content, including community analysis; biogeochemistry; bioclimatology; biogeography; and system ecology. Prereq: 4310. 5340, 5530. May be repeated with consent of department.

6590 Advanced Topics in Systematic Botany (2-4) Needs of student determine content, such as morphology and evolution of vascular plants; biobisystematics (systematic literature and code of nomenclature); and current research in systematics; systems of classi- fication. Seminars or lectures and labs depend- ing on subject. Prereq: 3020. May be repeated with consent of department.

Chemistry

MAJOR DEGREES

Chemistry

THE MASTER'S PROGRAM

The department offers specialization in seven areas for the M.S. degree: analytical, environmental, inorganic chemistry, organic chemistry, polymer science, and physical chemistry.

The requirements for the M.S. degree in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give 9 to 18 hours of graduate credit (5000).
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate course work in chemistry and/or a related field to make an overall total of 45 hours. These additional hours must include one of the following sequences: 5110-20-29-30, 5250-59-60-69-70-79, 5340-50, 5410-20-30, 5710-20-30.
4. Participation in seminar (5911-21-31) during the entire period of graduate study. (No more than 3 credit hours of seminar may be applied to the above requirements.)
5. A final oral examination.

M ASTER S OF ARTS IN COLLEGE TEACHING

The requirements for the M.A.T. degree in Chemistry in Chemistry consist of the satisfactory completion of:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate course work in chemistry and/or a related field to make an overall total of 45 hours. The additional hours must include two of the following sequences: 5110-20-29-30, 5250-59-60-69-70-79, 5340-50, 5410-20-30, 5710-20-30.
4. Participation in seminar (5911-21-31) during the entire period of graduate study. No more than 3 credit hours of seminar may be applied to the above requirements.
5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers specialization in nine areas for the Ph.D. degree: analytical chemistry, chemical physics, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, physical chemistry, and theoretical chemistry. For the Ph.D. degree in Chemistry with specialization in analytical, inorganic, organic, physical, or theoretical chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Participation in seminar (5911-21-31) during the entire period of graduate study.
4. Thirty-nine hours of additional graduate course work including at least 6 hours at the 6000 level. For emphasis in environment, these additional courses must include Chemistry 5220, 5250-59-60-70-79, 5340-50, 5410-20-30, 5710-20-30.
5. A comprehensive advanced examination in the field of specialization.
6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
7. A final oral examination.

For the Ph.D. degree in Chemistry with specialization in polymer science, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70 and one of the following: 5511, 5521, 5531.
3. An examination on the basic principles of mechanics, electricity, and magnetism.
5. The requirements listed in items 3, 5, 6, and 7 above.

The program in chemical physics is conducted jointly with the Physics Department which offers the Ph.D. degree in physical chemistry. A program leading to the Ph.D. degree with specialization in polymer science is conducted jointly with the Department of Chemical, Metallurgical, and Polymer Engineering, which offers a degree with similar specialization. This specialization...
requires satisfactory completion of:

1. Research and a dissertation to give at least 3 credits toward a Ph.D.

2. Chemistry 4160-70, 5531, 5140-50, 5160 or 5170, Polymer Engineering 4910.

3. Participation in Chemistry Seminar (3911-21-31) and the Polymer Seminar (5911-21-31) throughout the entire period of graduate study.

4. Thirty hours of additional graduate work course, including at least 6 hours at the 4000 level and no fewer than 2 hours from the Department of Chemistry offerings.

5. A comprehensive advanced examination in polymer science.

6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

7. A final oral examination.

*3211-21-31 Organic Chemistry (3, 3, 3) Compounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Must be taken in sequence. Prereq: 1101. Coreq: 3219-29-39 is a coreq for students not having credit for the laboratory.

*3219-29-39 Organic Chemistry Laboratory (1, 1, 1) Experiments on topics discussed in 3211-21-31. Coored: 3211-21-31 is a coreq for students not having credit for the lecture.


*3429-39 Physical Chemistry Laboratory (1, 1) Gases, liquids, chemical equilibria, solutions, phase equilibria, reaction kinetics and electrochemistry. Prereq or coreq: 3420-30. 1 lab.

*3511-21-31 Principles of Organic Chemistry (3, 3, 3) Structure and reactivity of aliphatic and aromatic compounds emphasizing reactions of synthetic utility. Use of spectroscopic and physical techniques to elucidate reaction mechanisms. Prereq recommended for chemistry majors and students planning careers in physical or biological sciences. Must be taken in sequence. Coreqs: 3211-21-31 or 3219, 3529-39 as a coreq; latter is recommended.

*3529-39 Organic Chemistry Laboratory (1, 1) Experiments on topics discussed in 3521-31. Similar to 3229-39 except designed for students who have had one year of physical chemistry. Corresponding lecture (3521-31 or 3221-31) is coreq for students not having credit for the lecture.

*3810 Radioactivity and its Applications (3) Radioactive materials in tracer and therapeutic applications. Radioactive decay, detection apparatus and methods, tracer procedures and precautions in agriculture, biology, medicine, nutrition. Not for credit by chemistry or physics majors or minors. Prereq: 1 yr of general mathematics or equivalent, 1 yr of general chemistry, 2 hrs and 1 lab.


4119 Physical Chemistry Laboratory (1) Solutions, phase equilibria, reaction kinetics and spectroscopy. The corresponding course 4110 is coreq.

4160-70 Intermediate Physical Chemistry (3, 3) (Designed for entering graduate students who have had one year of physical chemistry.) 4160—The three laws of thermodynamics, phase equilibrium, chemical reactions, kinetic equations. 4170—Gases and kinetic theory, chemical kinetics, molecular spectroscopy, and introduction to chemical statistics.

4210 Advanced Analytical Chemistry (3) Chemical separations including chromatography, ion exchange and solvent extraction; spectrophotometric, spectrometric techniques, introduction to analytical chemistry. Prereq: 3420 or 4290.

4229 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4220. Coreq: 4210.

4220 Advanced Analytical Chemistry (3) Electroanalytical methods of analysis (including potentiometry, coulometry, polarography, and volometry); magnetic resonance methods; mass spectrometry; x-ray absorption and fluorescence techniques. Prereq: Analytical Chemistry. Recommended: 3420 or 4290.

4320 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4220. Coreq: 4220.

4420 Physical Inorganic Chemistry (3) Theoretical concepts leading to an understanding of inorganic chemistry; quantum theory of the atom, principles of molecular structures, and elements of valence bond theory. Chemical reactions. Coreq: 4110.

4430 Intermediate Inorganic Chemistry (3) Application of theoretical concepts to inorganic elements, their chemical states, and their reactions. Prereq: 4420.

4510 Organic Qualitative Analysis (3) Identification of organic compounds and mixtures. Prereq: 3211-21-31, 3219-29-39 or 3219, 3529-39, 3 lab. Not open to students who have completed 4510.

4550 Organic Reaction Mechanisms (3) Prereq: 1 yr of organic chemistry.

4610-20 Advanced Chemical Experimentation (2, 2) Laboratory course in application of modern experimental techniques to solution of chemical problems. Synthesis and characterization of organic and inorganic compounds with emphasis on independent study using advanced techniques. Prereq: 3231-39 or 3531-39, 3430-35, 4220, 4610 not open to students who have completed 4510.

4910-20-30 Biophysical Chemistry (3, 3, 3) Physical chemistry of molecules important in biological systems. Must be taken in sequence. Not open to students having 3410-20-30. 4910—General and third laws of thermodynamics; equilibrium. 4920—Solution chemistry; electrochemistry; kinetics; nuclear chemistry. 4930—Elementary quantum mechanics; optical and magnetic spectroscopy; light scattering; macromolecular properties. Prereq: 1100-20-30; Mathematics 1540-50 or equivalent.


5129 Advanced Organic Chemistry Laboratory (3) Synthesis and characterization of organic compounds using modern techniques. Prereq: 1 yr of organic chemistry.

5140 Introductory Polymer Chemistry (3) Fundamental aspects of polymer science. Introduction to interdisciplinary field of polymer science; relation of molecular structure to bulk properties of polymers. Prereq: 3430 or each undergraduate organic and physical chemistry.

5150 Kinetics of Polymerization (3) Kinetics of formation and molecular weight distributions of polymers, homogeneous and heterogeneous step growth and chain growth polymerizations. Prereq: 5140 and 4160-70 or equivalent.


5170 Physical Chemistry of Polymers (3) Rubber elasticity; solution properties of macromolecules; structural, configurational, and conformational statistics of polymers. Prereq: 5150.

5220 Analytical Chemistry of Environmental Pollutants (3) Application of modern analytical chemistry to problems in aquatic and atmospheric pollution. Prereq: 5250-60-70 or consent of instructor.

5240 Electronics for Chemists (4) Includes material of Chemistry 4640 plus special project. Prereq: Consent of instructor.

5250-60-70 Advanced Analytical Chemistry Laboratory (1, 1, 1) Experiments on chemical separations and instrumental methods covered in concurrent lecture course. Prereq: 1 yr or each undergraduate chemical analysis and chemistry; latter is recommended: 5250 for 5259; 5260 for 5269; 5270 for 5279.

5340 Quantum Chemistry (3) Postulate approach to fundamental principles of quantum mechanics. Accurate solutions to Schroedinger equation; approximate (ab initio) and semiempirical methods; molecular orbital methods; calculation of molecular properties.

5350 Quantum Chemistry (3) Electronic excited states; introduction to group theory; perturbation theory; reactivity of organic molecules. Prereq: 5340.

5410-20-30 Advanced Physical Chemistry (3, 3, 3) Classical thermodynamics. 5420—Molecular spectroscopy and structure. 5430—Chemical kinetics. Prereq: 4110 or 4160-70.


5511 Survey of Inorganic Chemistry (3) Atomic structure, wave mechanical atoms, ionic and covalent bonding, dissociation, lattice energy, formation of ionic compounds, periodicity, inorganic stereochemistry, coordination chemistry, and descriptive chemistry of the elements.

5521 Survey of Analytical Chemistry (3) Volu- metric and gravimetric analysis; acid-base, oxidation-reduction, complexation and precipitation equilibria; spectroscopic, electroanalytical, and separation methods.

5531 Survey of Organic Chemistry (3) Bonding in organic molecules, chemistry of hydrocarbons, alicyclic compounds and conformational analysis, monofunctional oxygenated derivatives, carbonyl compounds, stereochemistry, aro- matics, and spectral analysis of organic molecules by infrared, ultraviolet, nuclear magnetic resonance and mass spectrometric techniques.

5550 Industrial Chemical Research (3) Practice of modern industrial research taught by case studies and via actual industry research projects. Course content varies, selected to illustrate good past and current industrial research prac- tices. Completion of a 5000 chemistry course sequence.

5610-20-30 Chemical Basis of Energy Conversion (1, 1, 1) Chemistry of various energy and fuel interconversion systems. Introduction to homogeneous and heterogeneous catalysis, thermodynamics of energy conversion systems, fossil fuels chemistry, and electrochemical and
photochemical conversion systems. Prereq: 5410 and one 5000 sequence.

5710-20-30 Theoretical Inorganic Chemistry (3, 3, 3) 5710—Nature of chemical bonding; ionic, covalent, and hybrid bonding. 5720—Organometallic chemistry. 5730—Investigational methods of structural inorganic chemistry. Prereq: 1 yr of physical chemistry.

5810 Nuclear Chemistry (3) Nuclear properties, radiation detection, decay processes, nuclear structure and models, nuclear reactions, radiations and matter, radiation detection. Prereq: Consent of instructor.

5911-21-31 Chemistry Seminar (1, 1, 1) Discussion of departmental research, current research literature and general topics. May be repeated. Registration required each quarter except summer resident graduate students. S/NC only.

6000 Doctoral Research and Dissertation

6111 Selected Topics in Organic Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6130 Natural Product Chemistry (3) Structure, chemistry, and synthesis of naturally occurring substances of biological or environmental significance and their structural analysis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


6165 Orbital Symmetry Control (3) Application of Woodward-Hoffman rules and other theorems to mechanism and stereochemistry of concerted organic reactions. Prereq: Two of 5110-20-30-35.

6175 Organic Photochemistry (3) Physical and chemical effects of electron excitation of organic molecules. Experimental and theoretical techniques of photochemical importance. Inter- and intramolecular reactions of alkenes, ketones, dienes, diones, aromatic compounds, and other photoactive species. Prereq: Two of 5110-20-30-35.


6210 Advanced Analytical Spectroscopy (3) Newer methods of spectroscopic analysis, including: transform methods, lasers in spectroscopy, fiber optics, introductory nonlinear optics, and spectroscopic techniques for remote sensing. Prereq: 5250.

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6311 Selected Topics in Polymer Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5140-20-30-60-70 or consent of instructor. May be repeated.

6320 Natural Polymers (3) Structure, modification, and nonbiochemical utilization of natural polymers. Prereq: 5140 or two of 5110-20-30-35.

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5410-20-30-60, 5340-50. May be repeated.

6420 Nuclear Magnetic Resonance (3) Theory of nuclear magnetic resonance spectroscopy with emphasis on high-resolution methods. Application to problems in molecular structure and behavior. Prereq: 5110-20-30-35.

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes pertaining to excitation of molecules by photons; mechanisms, multiphoton processes and uses of laser sources; fluorescence and phosphorescence; radiationless transitions as studied by optoacoustic spectroscopy; chemical reactivity of excited states; ion-molecule and free radical reactions; electron capture and electron-transfer processes. Prereq: 5430.

6450 Electrochemistry (3) Electrical double layer; electrode kinetics; transport properties of electrolytes; electroanalytical methods. Prereq: 5430 or 5270.

6475 Electronic Structure of Radicals (3) Application of electron spin resonance to study of molecular conformation, structure, and bonding in organic and inorganic radicals, comparison of experimental results with theoretical predictions. Prereq: 5110-20-30-35.

6480 Statistical Thermodynamics (3) Application of statistical mechanical methods to systems of chemical interest such as isotope effects on equilibrium and rate processes, phase equilibria, condensation phenomena. Prereq: 5410, 5450.

6485 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces, reactions across sections, direct vs complex modes of reaction, photofragmentation, energy partitioning, chemical excitation, and chemical lasers. Prereq: 5430.

6510 Thermodynamics of Solutions (3) Theory of regular solutions and of electrolyte solutions; measurement of activity coefficients and other thermodynamic properties; selected topics from literature. Prereq: 5410.

6520 Magnetic Resonance (3) Principles of magnetic resonance spectroscopy underlying nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq: 5430.

6711 Selected Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance: photoelectron spectroscopy, transuranium chemistry, organometallic compounds, inorganic solution kinetics and mechanisms, crystal chemistry, nonaqueous chemistry, chemistry of halogens and compounds. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


6750 Molten Salt Chemistry (3) Structure, spectroscopic properties, solution thermodynamics, electrochemistry and phase equilibria of molten salts. Solutions of inorganic, molten salts. Prereq: 4110 and 5410 or equivalent.

6810 Vibrational Problems in Molecular Spectra (3) (Same as Physics 6810.)

6811 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance: nuclear decay schemes, nuclear models, nuclear reaction theory, nuclear detection techniques, activation analyses. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6820 Molecular Vibration-Rotation Theory (3) (Same as Physics 6820.)

Classics

Professor: H. G. Rutledge (Head), Ph.D. Ohio State; A. Rapp (Emeritus), Ph.D. Illinois.

Associate Professors: M. K. McGinnis, M.A. Arkansas; J. E. Shelton, Ph.D. Vanderbilt.

Assistant Professors: G. C. Gesell, Ph.D. North Carolina; B. J. Levy, Ph.D. Texas; P. J. Mersereau, Ph.D. Ohio State.

The graduate courses in the Classics include the wider reading of Greek or Latin authors in a selected field, a more detailed study of one of the great departments of classical literature, and the development of background for the appreciation of Greek or Roman life and literature.

Greek

3010 Plato (3) 3020 Herodotus (3) 3030 Euripides (2) 3040 Aeschylus, Sophocles (3) 3060 Lysias (3) 3040 Aristophanes (3) 3050-60-70 Directed Readings in Greek (3, 3, 3)

Latin

3440 Livy (3) 3450 Pliny and Martial (3) 3460 Elegiac Poets (3) 4120 Horace, Satires and Epistles (3) 4310 Selected Readings From Latin Literature (3) 4320-30 Selected Readings from Latin Literature (3, 3) May be repeated. 4340 Horace, Odes (3) 4350 Tacitus (3) 4360 Lucretius (3) 4370 Readings in Medieval Latin (3) 5410-20-30 The Latin Epic: Lucretius, Vergil, Lucan (3, 3, 3) 5510-20 Roman Comedy: Plautus, Terence (3, 3, 3)

GENERAL COURSES

3210 Early Greek Mythology (3) Comprehensive study of Greek myths through readings, lectures, and discussion with emphasis on significance for Greek thought and religion. Slides and tapes illustrate influence of Greek myths on art, music, and literature of ancient Greek and later cultures. (Same as Religious Studies 3210.)

3220 Greek Mythology in the Classical Period (3) A study of use of myth in literature, history, religion, philosophy, and art of Classical Age of Greece, and change of attitude toward myth from earlier periods. Familiarity with basic Greek myths is assumed. Readings, lectures, slides, and discussion. (Same as Religious Studies 3220.)

3230 Roman Mythology (3) Study of myths created by Romans, as well as those the Romans borrowed from Greeks, with reference to Roman attitude toward history, religion, and society. Readings, lectures, slides, and discussion. (Same as Religious Studies 3320.)
3310 Art and Archaeology of the Aegean Bronze Age and Early Greece (3) Troy, the Cyclades Islands, Greek mainland, and Crete. Emphasis on palaces of Crete and Mycenae, Tiryns, and Pylos, and their fall, the following Dark Age, and rebirth of Greek civilization. Illustrated lectures.

3320 Art and Archaeology of Archaic and Classical Greece (3) Survey of development of Greek architecture, sculpture, and painting from 650 B.C. to death of Alexander. Illustrated lectures.

3330 Art and Archaeology of Hellenistic Greece and Rome (3) Hellenistic Greek, Etruscan, and Roman sculpture, painting, and architecture with attention to city planning. Illustrated lectures.

3340 Cities of the Greek and Roman World (3) Archaeological survey of Greek and Roman cities from 3000 B.C. to 500 A.D. with emphasis on development of city planning and quality of life. Such cities as Mycene, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied.

3590 Shriners and Sanctuaries of the Greek and Roman World (3) Study of major shrines and sanctuaries of Greek and Roman world with emphasis on archaeological remains. Such sites as Olympia, Epidauros, Peitum, Cumae, Praeneste, and Baalbek will be considered. Readings in selected classical authors will add to understanding of place of great shrines and sanctuaries in Greek and Roman life.

4010 Greek Drama in English Translation (3) A survey of dramatic masterpieces of Greek literature. 

4210 Teaching of Latin (3) Carries no language credit. May be repeated with consent of department.

4220 Seminar in Classical Studies (3) Special topics in problems of literature, society, and art. Prereq: completion of three courses in foreign language, extensive reading in field, and retirement from plan of study. May be repeated with consent of department.

4510 Selected Readings in Latin Literature in Translation (3) Content varies; may be repeated with consent of department.

5500 Problems in Old World Archaeology (3) (Same as Anthropology 5620.)

Comparative Literature

H. C. Rutledge, Chairperson

4013-22-32 Special Topics in Comparative Literature (3, 3, 3) Content varies; may be repeated.

4059-60-70 Dante and Medieval Culture (3, 3, 3) (Same as Italian 4059-60-70).

5012 Comparative Theories of Literature (3) Croce, Richards, Frye, Wellkem, and others. Prereq: Completion of three literature courses in foreign language above 3000, or equivalent.

5022 Approaches in Comparative Literature (3) French and American schools; "comparative literature" vs "general literature"; Van Tiegna, Carley, A. German, Wellek. Prereq: 5012. Completion of three literature courses in foreign language above 3000, or equivalent.

5032 Studies in Comparative Literature (3) Independent research problems. Prereq: 5012 and 5022.

Computer Science

MAJOR

Computer Science

DEGREE

M.S.

Professors:

R. T. Gregory (Head), Ph.D. Illinois

F. Donaldson, Ph.D. Pennsylvania State

P. D. Auburn (Mathematics); G. R. Sherman, Ph.D. Purdue (Director of Computing Center).

Associate Professors:

R. M. Aiken (Columbus), Ph.D. Northwestern; T. Feagin, Ph.D. Texas (Aerospace Engineering); R. C. Gonzalez, Ph.D. Florida (Electrical Engineering); E. L. Hall, Ph.D. Missouri (Electrical Engineering); C. E. Hughes, Ph.D. Pennsylvania State; K. C. O'Kane, Ph.D. Pennsylvania State; S. M. Seiilkow, Ph.D. Pennsylvania; M. G. Thomason, Ph.D. Duke.

Assistant Professors:

C. Alvarez, Ph.D. SONY (Buffalo); S. R. Jordan, Ph.D. Wisconsin; J. M. McNeill, Ph.D. Ohio State; C. P. Pfleger, Ph.D. Pennsylvania State; D. W. Sliraft, Ph.D. Texas.

Instructor:

C. W. Thompson, M.A. Texas.

ENTRANCE REQUIREMENTS TO M.S. PROGRAM

Upon admission to the Graduate School, students who wish to enter the Master's degree program in Computer Science should have the following background:

1. Mathematical maturity at least equivalent to that of a student who has completed the calculus sequence through one year of multivariable calculus and matrix algebra.
2. Computer Science 3155 or an equivalent introductory numerical algorithms course.
3. An introduction to probability and statistics at least at the level of Statistics 3450.
4. Computer Science 3715 or an equivalent introductory course in discrete structures and logical foundations of computer science.
5. Computer Science 3510 and 3520 or equivalent courses in advanced FORTRAN programming, machine organization and assembler language programming.

THE MASTER'S PROGRAM

All students must receive departmental credit for or exhibit proficiency in the following courses:

1. Computer Science 4550 and 4510
2. Electrical Engineering 5615-25-35
3. One of the three courses Computer Science 4710, 4035, or 4225.

The student may then select either Plan A or Plan B.

Plan A: Thesis Option

1. Complete 36 hours of courses at the 4000 level or above, including at least 18 hours at the 5000 level, exclusive of Electrical Engineering 5615-25-35.
2. Complete at least 9 additional hours of thesis credit, Computer Science 5000.
3. Pass an oral examination by a committee of at least three faculty members.

Plan B: Non-Thesis Option

1. Complete 45 hours of courses at the 4000 level or above, including at least 27 hours at the 5000 level, exclusive of Electrical Engineering 5615-25-35.
2. Pass written and oral comprehensive examinations.

Under either plan, courses which are taken from a department other than computer science must have the approval of the Computer Science Department.

5310 Introduction to Numerical Algorithms and Programming (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. Introduction to programming in FORTRAN. 3150 and 3155 may not both be taken. Students interested in language programming, or parallel programming, of FORTRAN should take 3155. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3155.)

5315 Introduction to Numerical Algorithms (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. 3150 and 3155 may not both be taken for credit. Students with no knowledge of FORTRAN should take 3150. Prereq or coreq: 1510 or 1610 or consent of instructor. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3155.)


5370 Programming Languages (4) Comparison and analysis of programming languages and their features. Languages to be discussed will include SNOBOL, LISP, APL, and PASCAL. Prereq: 2510.

3715 Discrete Structures (3) Introduction to discrete structures useful in computer science. Sets, set logic. Relations, functions. Proof techniques, induction, logic. Graphical representations and algorithms. Prereq: 1510 or 1610 or 3150 or equivalents. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3715.)

4050 Number Systems for Digital Computers (3) Floating-point number representation, mixed-radix number representation, multiple-modulus residue number representation, finite-segment p-adic number representation, errors in floating-point computation, finite fields and exact computation using digital computers. Prereq: 1510. (Same as Mathematics 4055.)

4225 Numerical Solution to Equations and Numerical Approximations (3) (Same as Mathematics 4225.)

4235 Numerical Methods for Ordinary Differential Equations (3) (Same as Mathematics 4235.)

4245 Numerical Linear Algebra (3) (Same as Mathematics 4245.)

4510 Computation in Statistical Analysis (3) Use of digital computer in standard statistical analyses, such as frequency tabulations, percentiles, and data reduction, correlation and regression, analyses of variance. Not for credit for Computer Science majors.) Prereq: Statistics 2500 or equivalent. An elementary knowledge of a programming-oriented language such as FORTRAN is also assumed.

4300 Independent Study in Computer Science (1-3) Special project in area of student's primary interest. To be arranged by Computer Science faculty, perhaps jointly with student's faculty advisor. Prereq: Consent of instructor. May be repeated. Maximum 6 hours.

4510 Data Structures and Nonnumeric Programming (3) Data structures and algorithms for their manipulation. Arrays and orthogonal lists; stacks, queues, rings, doubly-linked lists, trees; dynamic storage allocation; organization of files, programming languages for information structures. Prereq: 3520. Prereq or coreq: Knowledge of SNOBOL equivalent to that gained in 3570.
Economics

See College of Business Administration.

English

MAJOR

DEGREES

M.A., M.A.C.T., Ph.D.


Associate Professors: L. H. Burghardt, Ph.D. Chicago; D. A. Carroll, Ph.D. North Carolina; B. K. Dumas, Ph.D. Arkansas; A. R. Enzer, Ph.D. Indiana; B. J. Gaines, Ph.D. Wisconsin; J. E. Gill, Ph.D. North Carolina; R. B. Miller, Ph.D. Brown; D. A. Myers, Ph.D. Penn; A. R. Patman, Ph.D. Colorado; F. K. Robinson, Ph.D. Texas.

Assistant Professors: J. A. Armistead, Ph.D. Duke; D. R. Cox, Ph.D. Michigan; D. P. Goslien, Ph.D. Yale; N. M. Gooien, Ph.D. Yale; T. J. Heffernan, Ph.D. North Carolina; R. H. Lebrun, M. A. Louisiana; G. J. Maland, Ph.D. Michigan; V. C. Martin, Ph.D. Tennessee; M. L. Prys, Ph.D. California (Santa Cruz); M. P. Richards, Ph.D. Wisconsin.

Visiting Lecturers: W. Dykesman, B.A. Northwestern; G. Griffiths, Ph.D. Vanderbilt.

Detailed information about the Master's and doctoral programs, and about individual graduate courses, may be obtained by writing the Director of Graduate Studies of English, McClung Tower. For admission forms, write to the Graduate School.

THE MASTER'S PROGRAM

The departmental requirements for the M.A. degree in English include (1) thesis and 36 quarter hours of courses in the Department of English or 45 quarter hours without a thesis, (2) evidence of proficiency in one foreign language, and (3) a final examination. The courses should include 12 hours at the 6000 level, 12 hours of additional courses at the 5000-6000 level, and 12 hours at any level for graduate credit, including the 3000-4000 level.

For the degree of Master of Arts in College Teaching (MACT) the requirements include (1) 45 quarter hours of courses in English, arranged as for the non-thesis M.A., (2) 2 hours in a special course designed for MACT students, (3) 3 hours of a tutorial in the teaching of freshman composition, (4) a thesis or 9 additional quarter hours of 5000- and/or 6000-level courses in English, (5) evidence of proficiency in one foreign language, (6) a final examination, and (7) a program of supervised teaching approved by the department.

THE DOCTORAL PROGRAM

The departmental requirement for the Ph.D. degree in English is completion of a minimum of three academic years of resident graduate study. This includes a balanced program of at least 72 quarter hours (or the equivalent) in English: 36 hours at the 6000 level; 24 additional hours at the 5000-6000 level; and 12 hours for graduate credit at any level, including the 3000-4000 level. In addition, 9 (or 8) hours approved by the department must be taken for graduate credit in a subject or subjects other than English. Normally a student with the M.A. from another university may transfer at least 36 quarter hours.

After all, or most, of the course work has been taken and after the two language requirements have been satisfied, the student will take four preliminary comprehensive examinations from several areas divided as the department directs. Successful completion of these examinations will be followed by the writing of the dissertation and by an oral examination in the field of the dissertation.

Any course work in the 5000 or 6000 series may be repeated for credit with the permission of the department.

*1211 Written and Oral English for Foreign Students (6) Rapid review of English grammar structures and pronunciation, with intensive oral, aural, and written drill. Required during the first quarter of residence of all foreign graduate students (graduates, undergraduates and transfer students) who are not excused from it on the basis of the English Proficiency Examination required of all foreign students.

*1221 Written and Oral English for Foreign Students (6) Emphasis on the more advanced structures of English grammar and on paragraph writing. Required during the first quarter of residence of all foreign graduate students (graduates, undergraduates and transfer students) who are not excused from it on the basis of the English Proficiency Examination demonstrated need for work in English structure, but not at the intensive level of English 1211. Required also of foreign students who complete 1211.

3070 Modern British Poetry (3) From Housman to Thomas and more recent poets.

3080 Modern American Poetry (3) From Robinson to Stevens and more recent poets.


3130 Tennyson and His Successors (3) Includes such poetry as the Pre-Raphaelites, humorists, and Decadents.

3160 Browning, Arnold, and Hopkins (3)

3150 Melville (3)

3210-20 English Literature and Culture of the Nineteenth Century (3, 3) Survey of literature dealing with leading movements in politics, science, religion, and the arts. 3210—1830 to 1875. 3220—1875 to 1900.

3311-32-33 Modern Drama (3, 3, 3) 3341— Continental to 1930, 3412—Contemporary since 1930. 3420—British, 3430—American. (Graduate credit normally limited to students in Speech and Theatre.)

3510 Sixteenth-century Prose and Poetry (3) More and Wyatt to Spenser.

3520 Elizabethan Drama (3) Marlowe, Jonson, and others.

3530 Jacobean Drama (3) Beaumont and Fletcher to Massinger and Shirley.

3620 Restoration and Eighteenth-century Poetry (3) Emphasis upon Dryden and Pope.

3620 Restoration and Eighteenth-century Drama (3) Dryden through Sheridan.

3630 Restoration and Eighteenth-century Prose (3) Defoe, Addison, Steele, Swift, and others.

3670 The Age of Johnson (3)

3710 Literature of English Bible (3) Types of Old Testament literature, including Wisdom literature.


3721 Introduction to Folklore (3) Essential terms and concepts in modern folklore-tolk life studies. Emphasis on North American materials: folklore, folktale, folksong, myth, legend, proverb, riddles, superstitions, dance, games, and architecture.

3910-20-30 Comparative Literature (3, 3, 3) 3910—Ancient, 3920—Medieval and Renaissance, 3930—Modern.

3940 The Novel of the Contemporary Western World (3) Proust, Joyce, Mann, and others.

4010-20 Shakespeare (3, 3) 4100—Early plays, c. 1500-1601, including Henry IV, Twelfth Night, Hamlet. 4200—Later plays, 1601-1613, with emphasis upon tragedies and dramatic romances.

4042-43 Topics in Mode and Genre (3, 3) Content varies. Special topics in principal forms and modes of British and American literature: folk tale, folktale, and musical, lyric, satire, etc. May be repeated with consent of department. Maximum 6 hrs each.

4045-46 Topics in Literary Theory and Criticism (3, 3) Content varies. Special topics in theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 6 hrs each.

4500-60-70 American Novel (3, 3, 3) 4500—From earliest sentimental novels through Brown, Cooper, and Kennedy, and major figures to 1875. 4600—Henry James and Mark Twain through early works of Faulkner and Hemingway. 4700—Early thirties to present.

4140-50 Technical Writing (3, 3) 4140—For students planning careers in science, health, and technical writing. 4150—For science writing. 4150—For science writing. 4150—Writing of scientific feature articles in which data are marshalled and analyzed for human interest.

4250 Advanced Fiction-Writing (3) Further development of skills acquired in basic Writing Fiction course. Prereq: 3450 or consent of instructor.

4254 Writing the Detective and Mystery Story (3) Instruction and writing cover entire crime field—suspense, police procedural, private eye, spy, and adventure fiction. Recommended prereq: 3450-70 or consent of instructor.

4255 Writing Science Fiction and Fantasy (3) Survey of genres, characters, and techniques. 4150—Writing of scientific feature articles in which data are marshalled and analyzed for human interest.

4270 Advanced Poetry Writing (3) Further development of skills acquired in basic Writing Poetry course. Prereq: 3470 or consent of instructor.

4310-20-30 The British Novel (3, 3, 3) 4310—Defoe to Jane Austen. 4320—Scott to Thackeray. 4330—George Eliot to Galsworthy. 4340—James Joyce to present.

4440 Sociolinguistics (3) Exploration of language patterns in reports, or subjects other than English. Normally a student with the M.A. from another university may transfer at least 36 quarter hours.

1 John G. Hodge Professor

2 Alumni Distinguished Service Professor

* Not available for graduate credit.
REQUIREMENTS FOR THE BACHELOR'S DEGREE

4450 Dialectology (3) Theories and methodological approaches in teaching and learning of English as second or foreign language. Phonological and grammatical structures of present-day English. Analysis of differences (phonological, grammatical, and lexical) between English and another language. Prereq: Second year of a foreign language. 4451-Materials and methods of language teaching, with emphasis on preparation of materials and structured teaching situations. Theory of testing language competence and performance, with emphasis on construction of tests. Team teaching with an experienced member of the staff. Prereq: 4471. (Same as Linguistics 4471-81.)

4610-20-30 Black Literature (3, 3, 3) Trends and developments.

4851 Southern Literature through the Nineteenth Century (3) Southern writing from colonial period to end of nineteenth century, including frontier humorists and local color writers.

4852 Southern Literature in the Twentieth Century (3) Modern Southern literature, the English and Agrarians, Faulkner and more recent writers such as Welty, O'Connor, and Porter.

5000 Thesis (3) Research paper that is a result of the student's independent research in any field of study leading to the degree of Bachelor of Arts or Bachelor of Science.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated S/NC only.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

5110 Teaching Expository Writing (1) Using essays and personal experience as bases for creative composition. Weekly sessions on how to prepare and teach such a course. Grading of sample papers; supervised teaching; observation of other sections. Required of all first-year Teaching Assistants. S/NC only.

5120 Teaching Writing about Literature (1) Variety of literary works as subjects for student research and analysis. Same format as 5110. S/NC only.

5130 Teaching Business and Technical Writing (1) Forms and strategies appropriate to memo, letter, article, report, and proposals. Same format as 5110. S/NC only.

5150 Old English Prose (3)

5170-80 History of the English Language (3, 3) 5170-Pronetic transcription, Old English, development of inflection and syntax. 5170-Middle and Early Modern English, developments in pronunciation and vocabulary.

5210-20-30 Readings in American Literature from the Colonial Period to the Present (3, 3, 3, 3)

5240 Readings in Black American Literature (3) Critical analysis of poetry, prose, drama, criticism; historical and cultural background; discussion of relevance of influence of race as influence on text and reader.

5310 Rhetoric and Composition: Theory and Practice (3) Concentration on stylistics and types of expository writing.

5410-20 Readings in Middle English Literature (3, 3)

5510-20 Readings in Literary Criticism from Plato and Aristotle to the Present Day (3, 3)

5510-20-30 Readings in English Literature of the Nineteenth Century (3, 3, 3)

5710-20-30 Studies in Drama and Theatre (3, 3, 3)

5800 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, story of literature, and methods of research, including collecting of information, evaluation of material, and transmitting results of scholarship.

6000 Doctoral Research and Dissertation

6110-20-30 Studies in Elizabethan Literature (3, 3, 3)

6140 Studies in Old English Language and Literature (3) For students who know Old English well and who wish to do research in literature, structure of language, paleography, Anglo-Latin backgrounds and sources, and related topics.

6150 Old English Poetry (3) Prereq: 5150.

6160 Beowulf (3) Prereq: 5150, 6150.

6170 Studies in Middle English (3)

6181-82-83 Studies in the English Language (3, 3, 3)

6210-20-30 Studies in American Literature (3, 3, 3)

6241-42 Studies in Colonial American Literature (3, 3, 3) 6241-From Thomas Hariot through Increase and Cotton Mather. 6242-From Jonathan Edwards to adoption of Constitution.

6270-80 Studies in American Fiction (3, 3, 3)

6310-20-30 Studies in Victorian Literature (3, 3, 3)

6410-20-30 Studies in Chaucer (3, 3, 3)

6510-20-30 Studies in Spenser and Milton (3, 3, 3)

6550 Studies in Mode and Genre (3) Content varies. May treat drama, novel, short story, poetry, or satire, the comic, the tragic, etc., depending on professor.

6590 Special Topics (3) Content varies. Humor, history of ideas, biography, autobiography, literature of travel, literature and extra-literary disciplines, etc.

6610-20-30 Studies in English Romanticism (3, 3, 3)

6710-30-30 Studies in Eighteenth-century Literature (3, 3, 3)

6810-30-30 Studies in Drama and Theatre (3, 3, 3)

6860 Textual Bibliography and Criticism (3) Study of evidence gathered from printing processes to make critical judgments about text of literary work. Prereq: 5680 or consent of instructor.

6910-20-30 Studies in Twentieth-century Literature (3, 3, 3)

French

See Romance Languages

Geography

MAJOR

DEGREES

Geography

M.S., Ph.D.

Professors: S. R. Jumper (Head), Ph.D. Tennessee; C. S. Aiken, Ph.D. Georgia; E. H. Hammond, Ph.D. California; R. C. Liaw, Ph.D. Northwestern; T. H. Schmitz, Ph.D. Wisconsin.

Associate Professors: J. L. Belf, Ph.D. Iowa; L. W. Brinkman, Jr., Ph.D. Wisconsin; J. B. Rehder, Ph.D. Illinois.

Assistant Professors: J. L. R. Oliver, Ph.D. Tennessee; B. Raistin, Ph.D. Northwestern.

The Department of Geography offers the degrees of Master of Science and Doctor of Philosophy with concentrations in cartography and remote sensing (M.S. only), physical geography and human systems, urban geography, geography of Anglo-America, and rural and nonmetropolitan geography.

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours beyond completion of a sound undergraduate major program. Of these, half must be in courses numbered above 5000, in addition to thesis, and must include Geography 5150-60 and (at each offering during residency) 5100. Thesis and comprehensive examination required.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those persons who demonstrate productive conducting independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. All Ph.D. programs must include Geography 5170 and (at each offering during residency) 5100. Other course requirements will be determined by the student's committee in accordance with specific interests and needs. A normal program contains 75 hours in courses for graduate credit and includes a minimum of 15 hours in the 6000 series. A minimum of 15 hours of graduate credit must be earned in related fields outside the department. Registration in any course in the 6000 series may be repeated for credit with the permission of the department. Competence in one foreign language and pertinent quantitative techniques are required. The language will be French or German unless otherwise approved by the student's faculty committee. Written and oral qualifying examinations are required.

4510 Principles of Geomorphology (4) Same as Geology 4510.

4550 Geography of Soils (4) Soils as physical systems and their relationship to environments. Investigation of specific cases of the role of soils in management of environmental systems.

4610 Industrial Geography (4) Factors affecting location of manufacturing activities, with emphasis on the United States. Prereq: 3410 or consent of instructor.

4630 Geography of Agriculture (4)

4710 Cartography (4) Map construction, reproduction, and use. Prereq: 3410 or consent of instructor.

4720 Data Mapping (4) Methods for representing spatial distributions by maps and graphs. Mapable data may include phenomena as diverse as birth rates, voting patterns, and air pollution levels. Prereq: Consent of instructor.

4740 Remote Sensing: Types and Applications (4) Basic principles and uses of aerial photography and other remote sensing techniques. Emphasis upon value of various types of imagery for geographic interpretation and simple mapping. Prereq: Consent of instructor.

4750 Interactive Computer Graphics (3) (Same as Computer Science 4750.)

5000 Thesis

5100 Colloquium in Geography (1) Discussion of departmental research literature, and general topics. Registration at each offering required of resident graduate students. May be repeated. Maximum 8 hrs. S/NC only.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5150 Introduction to Geographical Research (3) Aims of geographical research; survey of printed source materials; practice in effective presentation of research findings.

5160 Research Design and Field Problems (4-4) Development of research problems, preparation of appropriate study designs, and practical field application. Normally offered as 4-week summer course for 6 hrs credit. Students may not take other courses or have duty assignments during this 4-week period.

5170 Geographical Concept and Method (3) Traditional and modern thought regarding nature, scope, problems, and methods of geography.

5200 Special Problems in Geography (2-6) Reading and research on problems or topics of interest to individual students. Students must define topic and receive instructor's approval of study plan before beginning research. May be repeated with consent of instructor.

5250 Topics in Historical Geography (3) Examination of trends, concepts and methods in historical geographical research of techniques developed by other disciplines. Prereq: 4100 or consent of instructor.

5260 Advanced Cultural Geography (3) Geographical analysis of rural settlement in Eastern United States, with emphasis upon New England, Tidewater East, and Upland South, and specific application to Southern Appalachians. Includes field work and final paper. Prereq: 3060 or consent of instructor.

5310 Topics in Regional Geography of the United States (3) Intensive analysis of problems and trends in less-developed regions of United States, excepting American South. May be repeated with consent of instructor. Maximum 9 hrs.

5320 Topics in the Geography of the American South (3) A survey of specific cases of the role of the eastern and southern counties of settlement and development. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development.

4510 Principles of Geomorphology (4) (Same as Geology 4510.)

5520 Advanced Urban Geography (3) Analysis of research on urban systems, internal morphology, urban ecology, and urban spatial behavior. Prereq: 3450 or consent of instructor.

5550 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methodologies of land-surface system. Prereq: 3520 or consent of instructor. May be repeated with consent of instructor.

5610 Topics in Climatology (3) Examination of trends, problems, and methods in modern climatology. Prereq: 3520 or consent of instructor. May be repeated with consent of instructor.

5710 Seminar in Geography (3)

5720 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate packaged computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 4740 or consent of instructor.

5740 Advanced Topics in Remote Sensing (3) Applied research using remote sensing and aerial photographic imagery for interpretation and mapping of geographic data. Prereq: 4740 or consent of instructor.

5915 Regional Geomorphology (4) (Same as Geology 5915.)

6000 Doctoral Research and Dissertation

6110-20 Seminar in Economic Geography (3, 3)

6220-30 Seminar in Urban Geography (3, 3)

6240-50 Seminar in Historical Geography (3, 3)

6260-70 Seminar in Cultural Geography (3, 3)

6310-20 Seminar in Rural Geography (3, 3)

6410-20 Seminar in Regional Geography of the United States (3, 3)

6610-20 Seminar in Regional Geography of Latin America (3, 3)

6710-20 Seminar in Physical Geography (3, 3)

Geological Sciences

MAJOR

DEGREES

Geology

M.S., Ph.D.


Assistant Professors: T. W. Broadhead, Ph.D. Iowa; T. W. Rapenne, Ph.D. Iowa; G. Briggs (Associate Dean), Ph.D. Wisconsin; H. J. Kiepfer (Emeritus), Ph.D. Ohio State; A. Brown, Ph.D. Lehigh; J. A. Schwartz, Ph.D. Tulane; A. E. Goodwin, Ph.D. Tennessee; M. H. Houtermans, Ph.D. Paris; J. D. Haag, Ph.D. Harvard; G. M. Clark, Ph.D. Pennsylvania; K. R. Walker (Acting Head), Ph.D. Yale; H. J. Klepser (Emeritus), Ph.D. Ohio State; J. G. Walls (Emeritus), Ph.D. North Carolina.

The department requires a minimum of 45 quarter hours including at least 18 hours in courses (other than thesis) numbered above 4000. A minimum of 24 hours in geology courses, in addition to thesis, is required. Students who enter with a minor or consent of instructor. May be repeated with consent of instructor or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs.

5200 Special Problems in Geography (2-6) Reading and research on problems or topics of interest to individual students. Students must define topic and receive instructor's approval of study plan before beginning research. May be repeated with consent of instructor.

5250 Topics in Historical Geography (3) Examination of trends, concepts and methods in historical geographical research of techniques developed by other disciplines. Prereq: 4100 or consent of instructor.

5260 Advanced Cultural Geography (3) Geographical analysis of rural settlement in Eastern United States, with emphasis upon New England, Tidewater East, and Upland South, and specific application to Southern Appalachians. Includes field work and final paper. Prereq: 3060 or consent of instructor.

5310 Topics in Regional Geography of the United States (3) Intensive analysis of problems and trends in less-developed regions of United States, excepting American South. May be repeated with consent of instructor. Maximum 9 hrs.

5320 Topics in the Geography of the American South (3) A survey of specific cases of the role of the eastern and southern counties of settlement and development. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development.

4100 Quantitative Methods in Geography (4) Geographic applications of statistical techniques, point pattern analysis and analysis of areal units. Prereq: Mathematics 3000 or consent of instructor.


4240 Historical Geography of the United States (4) Survey of changing human geography of United States during four centuries of settlement and development. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development.

4510 Principles of Geomorphology (4) (Same as Geology 4510.)

5520 Advanced Urban Geography (3) Analysis of research on urban systems, internal morphology, urban ecology, and urban spatial behavior. Prereq: 3450 or consent of instructor.

5550 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methodologies of land-surface system. Prereq: 3520 or consent of instructor. May be repeated with consent of instructor.

5610 Topics in Climatology (3) Examination of trends, problems, and methods in modern climatology. Prereq: 3520 or consent of instructor. May be repeated with consent of instructor.

5710 Seminar in Geography (3)

5720 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate packaged computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 4740 or consent of instructor.

5740 Advanced Topics in Remote Sensing (3) Applied research using remote sensing and aerial photographic imagery for interpretation and mapping of geographic data. Prereq: 4740 or consent of instructor.

5915 Regional Geomorphology (4) (Same as Geology 5915.)

6000 Doctoral Research and Dissertation

6110-20 Seminar in Economic Geography (3, 3)

6220-30 Seminar in Urban Geography (3, 3)

6240-50 Seminar in Historical Geography (3, 3)

6260-70 Seminar in Cultural Geography (3, 3)

6310-20 Seminar in Rural Geography (3, 3)

6410-20 Seminar in Regional Geography of the United States (3, 3)

6610-20 Seminar in Regional Geography of Latin America (3, 3)

6710-20 Seminar in Physical Geography (3, 3)
THE DOCTORAL PROGRAM
Specific course program and thesis topic determined by candidate's faculty committee.

1. Problem to be determined by faculty committee. Requirements include a minimum of 84 quarter hours in courses for graduate credit, in addition to dissertation. These courses must include a minimum of 5000 or 6000 series, of which at least 15 hours must be in the 6000 series. Up to one-third of the required hours may be taken in related fields. A Master's degree is recommended. Registration in any course in the 6000 series may be repeated for credit with the permission of the department.

2. Preliminary examination will be both written and oral.

3. Each Ph.D. student must satisfy a research tool requirement which will be determined by his/her faculty committee and which will consist of one of the following:
   a. Demonstration by examination of a reading knowledge in one modern foreign language in which there is a significant body of Geological literature.
   b. Completion of course 3030 in an appropriate foreign language with a B or better.

4. Courses (minimum of 6 hours) at 3000 level or higher taken for undergraduate credit and completed with a B average in appropriate mathematics, statistics, or computer science courses. The courses must be taken during a student's graduate program and must be approved by the student's entire committee.

In no case will option c above be available unless the student has had reading training as a college undergraduate in an appropriate foreign language.

*3160 Introduction to Earth Materials (4) Study of minerals and rocks. Laboratory includes both hand specimen and analytical methods of identification. Prereq: 1410, 2 hrs and 2 labs.

*3180 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen, chemical and X-ray methods of identification. Prereq: 1410, Chemistry 1110-20 or equivalent. 3 hrs and 1 lab.

*3210-20 Invertebrate Paleontology (4, 4) Systematic review of important invertebrate fossil groups. 3210—Protists to Brachiopoda, including sponges, coelenterates and bryozoa. 3220—Phoronida to Hemichordata, including annelids, molluscs, arthropods and echinoderms. May be taken separately or in any order. Prereq: 3200, Registration 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

*3250 Micropaleontology (4) Microscopic remains of animals and plants with special emphasis on stratigraphically important groups. Prereq: 3210 or consent of instructor. 3 hrs and 1 lab.

*3260 Paleobiology (4) Introduction to principles and materials of paleontology as applied to interpretation of earth history. Prereq: 1420, 3 hrs and 1 lab or field period.

*3270 Geological History of Land Organisms (4) Geological history and development of terrestrial biota and ecosystem with special emphasis on fossil record of land plants and vertebrates. Prereq: Biology 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

*3310 Introductory Petrology (4) Introduction to classification and properties of igneous and metamorphic rocks, processes which produce them, and tectonic environments in which they form. Laboratory emphasizes both hand specimen and microscopic study of important rock types. Prereq: 3180, 3 hrs and 1 lab.

*3330 Geology of East Tennessee (4) Lectures and field excursions. Prereq: 12 hrs of geology and consent of instructor.

*3360 Stratigraphy-Sedimentation (4) Introductory study of stratigraphic principles and practices and of sedimentary processes and interpretation of depositional environments. Prereq: 3180 and 3190, 3 hrs and 1 lab or field period.

*3370 Structural Geology (4) Introductory discussion of structures such as folds, faults, joints, cleavage, and primary structures. Laboratory work includes depth and thickness problems, structure sections, structure contour maps. Prereq: 1420, Mathematics 1840-50 or equivalent. 3 hrs and 1 lab.

*3410 Principles of Ground Water Geology (3) Geologic problems involving earth environment and resources, and geologic parameters associated with their control and misuse. Prereq: 1420 or consent of instructor. 2 hrs and 2 labs or field periods.

*3610 Quaternary Geology for Engineers (3) Erosional and depositional processes, landforms, ground water. Prereq: 2510 or equivalent. 2 hrs and 1 lab or field period.

*3710 Origin and Evolution of the Continents and Ocean Basins (4) Introductory study of origin of ocean basins and continents, changes in earth's crust with emphasis on modern concepts of continental drift and plate tectonics. Prereq: 1420.

4110 Principles of Economic Geology (4) Formation of mineral deposits. Prereq: 3180, 3370, or equivalent.

4115 Elementary Applied Geophysics (4) Basic principles of electrical, seismic, gravity and magnetic geophysical methods. Prereq: 1420, Physics 2220 or 2320, 3 hrs and 1 lab.

4130 Sedimentology (4) Introduction to physical processes of sedimentation: transport of sediments and formations of sedimentary structures, river flows, waves, tides, and ocean circulation. Prereq: 3150, 3 hrs and 1 lab.

4230 Paleoclimatology (4) Principles of environmental analysis applied to fossil assemblages and associated lithologies. Prereq: 3260 or consent of instructor. 3 hrs and 1 lab.

4240 Paleobotany (4) Survey of fossil record of plants with particular emphasis on comparative morphology and evolutionary trends in major plant groups, and chronological succession and geographical distribution of past floras on earth. Prereq: 1420 or 2510; Botany 3010-20 or consent of instructor. (Same as Botany 4240.) 3 hrs and 1 lab or field period.

4310 Geologic Mapping (4) Interpretation of geologic maps and sections. Prereq: 1420, 3 hrs and 1 lab or field period.

4370 Tectonic Styles (4) Elements, habitats, and geotectonic causes of basic styles of tectonic deformation are presented on maps, sections, aerial photographs and laboratory. Prereq: 3370 or consent of instructor. 3 hrs and 1 seminar or lab.

4440 Field Geology (6) Five-week field course, first term summer quarter. Advanced undergraduates or first-year graduates in geology. Emphasizes field trip scouting and selection of informative sites for field trips. Prereq: 12 hrs geology and consent of instructor.

4460 Geologic Photography and Photogrammetry (4) Principles of terrestrial and aerial geologic photography, including photographic principles and practice, geometry of terrestrial and aerial photographs, and image interpretation. Prereq: 3370 or consent of instructor. 3 hrs and 1 lab.

4510 Principles of Geomorphology (4) Gravitational processes acting on earth's surface and landforms produced. Prereq: 1410 or consent of instructor. (Same as Geography 4510.) 3 hrs and 1 lab.

4550 Optical Mineralogy (4) Identification of nonopaque substances by immersion methods, using petrographic microscope.

4560 Principles of Geochemistry (4) Application of chemical principles to geologic problems. Emphasis on crystal chemistry and relation between basic atomic structure and distribution and behavior of elements in the earth's crust. Prereq: Chemistry 1110-20 or equivalent. Recommended: 3310.

4565 Mineral Phase Equilibria (3) Principles of phase chemistry and application of phase equilibria to problems of earth and ocean science. Prereq: 4560. 3 hrs and 1 lab.

4569 Experimental Geochemistry Laboratory (1-3) Independent lab study of problem in geochemistry using lab techniques. Prereq: Consent of instructor.

5120 Geophysics—Gravity and Magnetic Methods (4) Potential methods, introduction to geodesy and geophysical interpretation of gravity and magnetic fields. Prereq: 3180. 1 lab or field period. 3 hrs and 1 lab.

5130 Geophysical Seismic Exploration Methods (4) Seismic reflection methods. Introduction to reflection seismic techniques, interpretation of seismic sections, introduction to earthquake seismology and earth's interior. Prereq: 4115 or consent of instructor. 3 hrs and 1 lab.

5190 Special Problems in Geology (1-4) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

5000 Thesis

5050 Geochronology of Ore Mineral Deposits (3) Study of ore deposits based on experimental, empirical, and theoretical geochemical considerations. Prereq: 4560 and 4110 or consent of instructor.

5069 Experimental Geochemistry Laboratory (1-3) Independent lab study of problem in geochemistry using lab techniques. Prereq: Consent of instructor.

5200 Geophysics—Gravity and Magnetic Methods (4) Potential methods, introduction to geodesy and geophysical interpretation of gravity and magnetic fields. Prereq: 3180. 1 lab or field period. 3 hrs and 1 lab.

5210-20 Special Problems in Geology (1-4, 1-4, 1-4)

5290 Quaternary Problems (4) Interdisciplinary approach to interpretation of physical and biological phenomena directly or indirectly influenced by Pleistocene glaciation. Prereq: Elements of geology (3 quarters) or consent of instructor. (Same as Botany 5290 and Zoology 5290.)

5310 Advanced Stratigraphy and Sedimentation (4) Integrated field-oriented study of sedimentary rocks, analysis of depositional environments, paleocurrents, and paleogeographic-paleotectonic setting. Prereq: 3350 or equivalent, 4130.

5340 Seminar in Local Stratigraphy (1) Stratigraphy of Knoxville area.

5350 Selected Topics in Geology (1-4) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. topics, from current literature, and subjects of general interest. Registration required each quarter except summer for resident full-time graduate students. S/NC only.
MAJOR

German Language and Literature

Ph.D.

Emeritus Professors:
E. T. Henkamer, Ph.D. Bonn (Germany);
R. L. W. Nordlie, Ph.D. Ohio State.

Professors:
H. Kratz (Head), Ph.D. Ohio State;
J. E. Falen, Ph.D. Pennsylvania;
W. H. Fuller, Ph.D. Wisconsin;
R. L. Miller, Ph.D. Cornell;
J. C. Osborne, Ph.D. Northwestern.

Associate Professors:
N. A. Lauckner, Ph.D. Wisconsin;
D. E. Lee, Ph.D. Stanford;
M. P. Rice, Ph.D. Vanderbilt.

Assistant Professors:
J. L. Elliott, Ph.D. Michigan;
D. M. Flene, Ph.D. Indiana;
C. J. Major, Ph.D. Chicago;
U. Rietschel, Ph.D. Illinois.

The Department of Germanic and Slavic Languages offers three advanced degrees. They are the Master of Arts (M.A.) in German, the Master of Arts in College Teaching (M.A.T.) in German, and the Doctor of Philosophy (Ph.D.) in German Language and Literature.

THE MASTER'S PROGRAM

In addition to the general Graduate School requirements as stated on page 18, the department requires 36 quarter hours in approved courses, including at least 18 hours in courses numbered above 5000. In addition to course work, the student is required to write a thesis, for which he/she must pass an oral exam before the candidate will be required to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications. The field of study is divided into (1) German literature and (2) German (or Germanic) philology or linguistics. A student may concentrate on one or the other. Dissertation and seminar research topics will be chosen in accordance with the varying preferences and specific interests of the faculty. Detailed programs will be established in each case by the student's faculty committee.

3010-30-30 Elements of German for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for students having completed elementary German.

3210-30-30 German Literature in English Translation (3, 3, 3, 3) Foreign language credit. No change in credit hours after add deadline. Students opting for 4 hrs credit will be expected to present an appropriate amount of extra work above that required for 3 hrs.

3240 Old Norse Literature in English Translation (3-4) Prose readings of sagas of Norwegian
kings, great Icelandic family sagas, and Vinland sagas, narrating discovery of America around 1000. Mythological and heroic poems of the Edda.

4110-20-30 Studies in Classical and Modern Writers (3, 3, 3) Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. May be repeated with consent of department.

4140-50 Selected Topics in German Literature from 1750 to the Present (3, 3) Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent.

4160 Studies in German Authors (3) Life and works of a single outstanding German literary figure. Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation). May be repeated.

4170 Theatrical German (1-3) Performance in one or more German plays. Prereq: Intermediate German or equivalent or consent of instructor. May be repeated with consent of department.

4210-20-30 Studies in German Literary Types (3, 3, 3) 4210—lyric poetry. 4220—Drama. 4230—Narrative prose. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30, 3310 or equivalent.

4256 Introduction to Descriptive Linguistics (3) (Same as French, Russian, and Spanish 4250.)

4266 Introduction to Historical and Comparative Linguistics (3) Linguistic change, prolan- guages. Phonological and morphological change. Cultural, historical, sociological influences upon the development of language. Semantic change. Lexicography. All these topics copiously illustrated by selected examples from Indo-European languages. Prereq: 9 hrs of upper division English, or 9 hrs of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30, courses in literature in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as French, Russian, and Spanish 4260.)

4310-20 History of German Language (3, 3)

4610-20-30 German Civilization (3, 3, 3) Prereq: Intermediate German or equivalent.

4810-20-30 Advanced Conversation and Composition (3, 3, 3) Prereq: 12 hrs of 3000 or 3010-20-30 or equivalent or consent of department.

5000 Thesis

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

5200 Proseminar (3) Bibliography; methods; illustrative problems; preparation of papers.

5210-20-30 College Teaching of German (1, 1, 1) Required of all M.A., M.A.C.T., or Ph.D. candidates, except those whose previous teaching experience warrants excusal from this requirement or who wish to pursue vocations other than teaching.

5410-20-30 Medieval German Language and Literature (3, 3, 3) 5410—Introduction to Middle High German; 5420-30—Readings in Medieval German Literature; 5500 Studies in German Literature (3) Content varies. May be repeated. Maximum 9 hrs.

5510 German Humanism and the Reformation (3)

5520 German Baroque Literature (3)

5530 The Enlightenment and the Rococo (3)

5540 German Classicism (3)

5550 Goethe’s Faust (3)

5560 German Romanticism (3)

5570 German Realism and Naturalism (3)

5580 Modern German Literature (1889-1945) (3)

5590 Modern German Literature (1945-Present) (3)

5600 German Literary Theory and Criticism (3)

5610-20-30-40-50-60 Directed Readings in German Language and Literature (3, 3, 3, 3, 3, 3) 5710 Introduction to Old Norse (3) Phonology, morphology, and syntax of Old Norse. Representative readings in Old Norse.

5720 Readings in Old Norse Prose (3) Intensive readings of Old Norse prose works. Icelandic sagas as literary genre.

5730 Readings in Old Norse Poetry (3) Intensive reading of Eddic poems as a literary genre and repository of ancient Germanic customs, legends, and mythology.

6000 Doctoral Research and Dissertation

6100 Gothic (3) Phonology, morphology, and syntax of Gothic language. Relationship to Indo-European and other Germanic languages. Readings from Gothic Bible.

6120-30 Old High German (3, 3) 6120—Introduction: phonology, morphology, and syntax of Old High German of eighth and ninth centuries. Dialects. Representative prose passages. 6130—Literature and Linguistics; prose and poetry of period from linguistic and literary point of view. Development of language in Old High German period.

6140 Old Saxon (3) Phonology, morphology, and syntax of Old Saxon. Representative readings.

6210-20-30-40-50-60 Seminar in German Literature (3, 3, 3, 3, 3, 3) May be repeated.

6310-20-30 Seminar in German and Germanic Philology (3, 3, 3) May be repeated.

Russian

3010-20-30 Elements of Russian for Graduate Students and Seniors (3, 3, 3) For graduate students preparing for language examinations and seniors desiring reading knowledge of a second foreign language. Prereq: 2 yrs of some foreign language in college or consent of department. Undergraduate credit only. No credit for students having completed 1 yr of Elementary Russian.

3210 Nineteenth-century Russian Literature in English Translation (3-4) Realism and the novel; selections from works of Pushkin, etc.

3220 Works of Leo Tolstoy in English Translation (3-4) War and Peace, Anna Karenina, and other works.

3221 Works of F. M. Dostoevsky in English Translation (3-4) Crime and Punishment, Brothers Karamazov and other works.

3230 Twentieth-century Russian Literature in English Translation (3-4) Russian modernism and literature under the Soviets.

3240 The Russian Drama in English Translation (3-4) Selections from works of Fonvizin, Gogol, Ostrovsky, Turgenev, Chekhov, and others.

3250 The Works of Ivan Turgenev and Anton Chekhov in English Translation (3-4)

3260 Russian Folklore in English Translation (3-4)

3270 Russian Philosophical and Theological Thought (3) A study of the development of philosophical and theological thought in Russia from the Middle Ages to the Revolution. Special emphasis on the expression of this thought in Russian literature and literary criticism. No knowledge of Russian required. (Same as Philosophy 3270 and Religious Studies 3270.)

4010 Selected Topics in Russian and East European Studies (3) Interdisciplinary seminar on selected topic using comparative approach.

4110-20-30 Studies in Major Russian Writers (3, 3, 3) Content varies. Pushkin, Lermontov, Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov and others. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30-40-50-60-70, 3310 or equivalent. May be repeated.

4210-20-30 Studies in Russian Literary Periods (3, 3, 3) 4210—Russian Romanticism; 4220—Russian Realism; 4230—Russian Modernism; Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30-40-50-60-70, 3310 or equivalent.

4250 Introduction to Descriptive Linguistics (3) (Same as French, German, and Spanish 4250.)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, French, and Spanish 4260.)

4270 Introduction to Slavic Linguistics (3)

4310-20-30 Advanced Studies in Russian Language and Literatures (3, 3, 3) For students majoring or minoring in Russian who are interested in language and linguistics. Includes problems in morphology and syntax, stylistics and translation techniques, and history of Russian language as well as other special problems for advanced students of Russian. May be repeated. Maximum 9 hrs each.

4410-20-30 Directed Readings in Russian (3, 3, 3) Intended primarily for students participating in program in Russian and East European Area Studies, course will involve individual study relating to student's major field. Prereq: 9 hrs of 3000 courses in Russian (exclusive of 3010-20-30, 3210-20-30-40-50-60-70, 3310) or equivalent.

Greek

See Classics

History

MAJOR

DEGREES

History

MA., M.A.C.T., Ph.D.

L. P. Graf (Head), Ph.D. Harvard; G. Broeker
Eliot (Emeritus); Ph.D. Harvard; J. P. Remley, Ph.D. Harvard; D. E. Duncan, Ph.D. California (Berkeley);
H. S. Fink (Emeritus), Ph.D. Princeton;
A. H. Haas, Ph.D. Chicago; Y. Hao, Ph.D. Harvard;
P. R. Hasin, Ph.D. California (Berkeley);
B. J. Keeley, Ph.D. Case-Western Reserve;
E. H. Trainer, Ph.D. Emory; J. G. Utley, Ph.D. Emory;
M. M. Klein, Ph.D. Columbia; R. A. Landen,
Ph.D. Princeton; J. A. Shepherd (Visiting), Ph.D.
West Virginia.

Associate Professors:

P. E. Bergeron, Ph.D. Vanderbilt; J. D. Bing,
Ph.D. Indiana; S. R. Blanshelle, Ph.D. Bryn Mawr; G. J. Finger, Ph.D. Washington; A. C. Hemp.
Winn, Ph.D. Harvard; C. W. Johnson, Ph.D. Michigan; P. A. Merr, Ph.D. Harvard; M. C. McDonald, Ph.D. Pennsy-
laviana; H. J. Morrow, Ph.D. Pennsylvania; J. Muldoyn,
Ph.D. Yale; P. J. Pinckney, Ph.D. Vanderbilt,
Ph.D. Emory; J. G. Uiley, Ph.D. Illinois; W. B. Wheeler, Ph.D. Virginia.

Assistant Professors:

S. D. Becker, Ph.D. Harvard; D. Case-Western Reserve;
N. L. Brann, Ph.D. Stanford; S. J. Kleiner,
Ph.D. Pittsburgh; R. B. Rice, Ph.D. Harvard.

THE MASTER'S PROGRAM

Master of Arts—Plan I: Course requirements include History 5240, and either 5250 or 5260; one M.A. reading course totaling least 6 hrs or above. Total hours, including thesis—45.

* Distinguished Service Professor.

* Alumni Distinguished Service Professor.
Plan II: History 5240, and either 5250 or 5260; two M.A. reading courses; 12 additional hours 5300 or above, at least 2 of which must be 5300-90-90, and 15 total hours—45. Plan I and Plan II require evidence of proficiency in one foreign language before the M.A. degree is granted.

Master of Arts in College Teaching—Course requirements include History 5240-50-60, 5271-72-73, and Continuing and Higher Education 5110. Students must spend one year as a graduate assistant and one year as a teaching assistant. Total hours, including thesis—60. Students seeking the M.A. degree at the University of Tennessee must be recommended by the Department of History.

(b) Students successfully completing the M.A. degree at the University of Tennessee must be recommended by the Department of History.

(c) Students from other institutions should have an M.A. degree and must be recommended for admission by the Graduate Awards and Review Committee after their first year of work at the University of Tennessee.

2. Residence and Course Work: Beyond the Bachelor's degree at the University of Tennessee must be supervised by the staff of The University of Tennessee.

3. Language Requirements: Candidates must have knowledge of one language and such additional language or languages as may be determined by the student's graduate committee. Under normal circumstances student specializing in European history will need two languages. The committee may specify any other research tools, such as statistics, which it regards as essential for the student's preparation.

The foreign language requirements may be satisfied in one of two ways:

(a) By examination. When the student is ready to take a language examination he/she should consult with an advisor. The appropriate forms and the time of the examination may be obtained from the Graduate School.

(b) By course work. Upon consultation with the advisor, a student may elect to complete an appropriate 3010-20-30 sequence in a language department (or an intermediate sequence in a language in which no 3010-20-30 sequence is available). Satisfactory completion requires that a student must have at least a B in the final quarter.

4. Preliminary Examinations and Committee: Incoming students will be advised by the department head. The preliminary examinations must be taken after all coursework is completed, language requirements fulfilled, and at least nine months before the degree is expected. These exams should normally be taken before beginning the ninth quarter of work toward the doctorate. The candidate must present four fields, distributed as follows: one major field (history), two minor fields (history); and one minor field which may be either in history or outside the department. In any case, the student is required to have 9 hours of graduate work outside the History Department. Three of the four areas listed below must be represented by a major or a minor field, or both.

I. Ancient and Medieval

(1) Ancient Near East
(2) Greece
(3) Rome
(4) Early Middle Ages, 375-1122
(5) Late Middle Ages, 1095-1450

II. Early Modern

(1) Renaissance and Reformation
(2) Europe, 1559-1815
(3) American History to 1815
(4) Latin America, 1492-1825

III. Modern

(1) Europe, 1815-1914
(2) European World Since 1914
(3) United States, 1815-present
(4) Latin America, 1789-present
(5) East Asia, 1841-present
(6) Middle East, 1798-present

IV. National, Sectional and Topical

(1) England, 1485-1763
(2) Great Britain, 1760-present
(3) France, 1559-1815
(4) France, 1789-present
(5) Germany, 1555-1806
(6) Germany, 1806-present
(7) Russia, 1600-1800
(8) Russia, 1800-present
(9) Colonialism and Imperialism
(10) Diplomatic History of the United States

III. Social and Cultural History of the United States

(1) The South
(2) Frontier and Westward Movement
(3) Afro-American

Preliminary examinations will be both written and oral.

5. Dissertation and Final Examination: Original research forms the basis for the dissertation. After the dissertation has been completed, a final oral examination will be given on the dissertation in its historical context.

3060-70-80 History of Western Religious Thought and Institutions (3, 3, 3) (Same as Religious Studies 3060-70-80)
3140-50-60 History of England (3, 3, 3) 3140—To 1688. 3150—1689 through the Reform Bill of 1832. 3160—1832 to the present.
3311-21 History of Tennessee, 1867—1895. 3312—1896 to 1915.
3411-12-13 Renaissance and Reformation (3, 3, 3) 3411—Renaissance. 3412—Reformation 1517-1600. 3413—Catholic Reformation and Wars of Religion. (Same as Religious Studies 3411-12-13)
3501-22-23 Early Modern Europe 1600-1786 (3, 3, 3) 3502—Seventeenth-century Europe. 3503—Ancient Regime. 3504—French Revolution and Napoleonic

4360 The United States in World War II (4) Military, diplomatic, and domestic experience.

4370 U.S. Military History, 1754 to the Present (4) Examination of nation's broad strategic aims and means used to attain them, shifting strategy, tactics and weaponry involved in our wars, and relationship between American society and its armed forces.

4380 Civilian-Military Relationships in the Modern World (3) Civilian-military relations and armed forces from about 1900 to 1960 in Western Europe, Russia, and America; emphasis on Western Europe: e.g., Dreyfus Affair. Army in Nazi Germany, and Truman-MacArthur controversy.


4470 Poland and Its Neighbors (3) A survey of Polish history from its beginnings to present, with some emphasis on the Polish question within context of modern international affairs.

4480 Russian Intellectual History (3) From eighteenth century to present, emphasizing problems of Westernization, nationalism, and revolutionary tradition.

4490 Soviet Foreign Policy (3)

4500 History of Medieval England (3)

4510-20 Tudor-Stuart England (3, 3) 4510—1485-1603. 4520—1603-1714.

4551 Great Britain from Burke to Bright (1780-1848)

4570 Twentieth-century Britain (3)

4580 Revolution and Reform: Ireland in the Nineteenth and Twentieth Centuries (4)

4590 History of Canada, 1775—Present (3)

4610-20-30 The American Frontier and Westward Movement I, II, III (3, 3, 3) Settlement and development of the "West" throughout American history. 4610—From the Atlantic to the Mississippi. 4620-30—The Trans-Mississippi West.

4640-50-60 Social and Cultural History of the United States (3, 3, 3) 4640—Colonial Society and Early Nation to 1825. 4650—1825-c. 1900. 4660—1900-present.

4670 Cities and Urbanization in American History (4) Origins, growth and influence of American cities in development of the nation, from colonial era to present.


4741 Italian City-States, 1250-1550 (3) Evolution of urban civilization in northern and central Italy in medieval and Renaissance periods. Architectural—History of secular forms studied in sociopolitical as well as cultural contexts. Florence is primary focus, but other major city-states also included.

4770-80 Austria and Central Europe (3, 3) 4770—To 1607. 4780—Since 1607.

4791 Modernization of the Middle East (3) Advanced reading and discussion course which examines key facets of political, economic, and social change in contemporary Middle East with emphasis on institution building, elites, and ideology. Prereq: 3795 or consent of instructor.

4792 Historical Writers in Islamic History (3) Advanced reading course which introduces the student to the major historical writers of the Middle East from Ibn Khaldun to modern times. Prereq: 6611 Middle East History or consent of instructor.

4811-21 History of Japan (4, 4)

4840 History of Mexico (3)

4850 History of the Caribbean (3) Caribbean region from discovery and colonization to contemporary times.

4870-80-90 China (3, 3, 3) 4870—Cultural history of China. 4880—Cultural history of contemporary China.


5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5015 Periods in European History (3) May be repeated. Maximum 9 hrs.

5016 Periods in American History (3) May be repeated. Maximum 9 hrs.

5011 Foreign Study—1(12) See page 100.

5012 Off-campus Study—1(12) See page 100.

5013 Independent Study (1-12) See page 100.

5121-5225 M.A. Reading Courses (3 hrs each) Directed reading courses in preparation for fields required for Master's oral examination. 5211, Ancient; 5212, Medieval; 5213, Early Modern Europe; 5214, Europe since 1789; 5215, American History to 1815; 5216, American History since 1789; 5217, Latin America; 5218, Far East; 5219, Colonialism and Imperialism; 5221, Western Europe; 5222, Russia; 5223, Germany; 5224, France; 5225, Middle East. Open only to Master's candidates in history. S/NC only.

5240 Introduction to Historical Research (3) Principles and techniques of research in the study of history. Required of all candidates for advanced degrees who do not present evidence of similar training elsewhere.

5260 European Historiography (3) Introduces the student to the historical literature of leading European nations.

5260 American Historiography (3) Like 5260 in the American field.

5271-72-73 The Teaching of College History (0, 0, 3) Introduction to problems of teaching at college level. May be taken for credit in history curriculum, 5271, types and levels of courses, and techniques of teaching. Prereq: Consent of instructor. Required of all candidates for the MACT. Credit will be withheld until the completion of 5273, with grades of "S" or "NC" submitted at end of each of first two quarters.

5280 Philosophy and Methodology (3) Philosophies of history and their relationship to milieux from which they emerge; modern trends in historical methodology.

5290 Quantitative Analysis of Historical Data (3) Prereq: Sociology 5320 and 5330, or consent of instructor.

5300 Topics in History (3)

5310 Topics in Women's History (3)

5320 Topics in Historical Editing (3) Principles and practice of editing documents.

5360 Topics in American Foreign Relations (3)

5410 Topics in Early Modern European History (3)

5440 Revolution and Restoration in Central Europe, 1780-1850 (3) Reform, resistance, and the advent of Liberalism and Nationalism.

5444 Topics in French History (3)

5450 Topics in Twentieth-century European History (3)

5480 Topics in Russian History (3)

5510 Topics in Tudor-Stuart England (3)

5520 Topics in Modern English History (3)

5550 Reaction and Reform in England, 1789-1848 (3)

5560 Anglo-Irish Relations (3)

5640 Topics in American Social and Cultural History (3)

5645 Topics in American Urban History (3)

5650 Topics in the American Westward Movement (3)

5660 Topics in Negro History (3)

5670 Topics in American Colonial History (3)

5675 Topics in the Early National Period of American History (3)

5680 Topics in Nineteenth-century American History (3)

5690 Topics in Twentieth-century American History (3)

5720 Topics in Medieval History (3)

5740 Topics in European Urban History (3)

5750 Topics in Ancient History (3)

5780 Topics in German National Socialism (3)

5790 Topics in Middle Eastern History (3)

5810 Topics in Andean History (3)

5820 Topics in Mexican History (3)

5850 Topics in Chinese History (3)

5860 Topics in Japanese History (3)

5910-20 Topics in Southern History (3, 3) 5910—Old South. 5920—New South.

6000 Doctoral Research and Dissertation

6210-20-30-40 Directed Readings (3, 3, 3, 3) Individual readings directed toward preparation for preliminary examination fields. Open only to candidates for Ph.D. degree who are in residence and who have been in residence at least two quarters. Only one course may be taken in preparation for each of four fields. Depending on field in which he/she is reading, student will be assigned to appropriate member of department. S/NC only.

6300 Seminar in Special Studies (3)

6310 Seminar in Tennessee History (3)

6350 Seminar in American Diplomatic History (3)

6410 Seminar in Western Europe (3)

6444 Seminar in French History (3)

6480 Seminar in Russian History (3)

6510 Seminar in English History (3)

6610 Seminar in American Colonial History (3)

6620 Seminar in The Era of the American Revolution (3)

6830 Seminar in Early National Period of American History (3)

6855 Seminar in Jacksonian Period (3)

6860 Seminar in Social and Cultural History of the United States (3)

6850 Seminar in the American Westward Movement (3)

6710 Seminar in Medieval Institutions (3)
MAJOR DEGREES

Mathematics

Professors: L. C. Lovelace (Head), Ph.D. Pennsylvania; G. E. Albert (Emeritus), Ph.D. Wisconsin; J. S. Bradley, Ph.D. Iowa; J. H. Garuth, Ph.D. LSU; R. E. Cling, Ph.D. Purdue; A. J. Davenport, Ph.D. Wisconsin; D. J. Dessart, Ph.D. Wisconsin; R. E. Cling; E. A. Z. Eger, Ph.D. Texas; H. Frandzen, Ph.D. Illinois; D. A. Gardiner, Ph.D. North Carolina State; R. T. Gregory, Ph.D. Illinois; E. S. Hallam, Ph.D. Missouri; D. B. Hinton, Ph.D. Tennessee; A. S. Householder (Emeritus), Ph.D. Chicago; R. L. Husch, Ph.D. Illinois; R. M. McCone (Emeritus), Ph.D. Duke; H. T. Mathews, Ph.D. Waterloo, Ont.; D. A. Tanen (Emeritus), Ph.D. Michigan; R. J. Plemmons, Ph.D. Auburn; K. C. Reddy, Ph.D. Indian Institute of Technology (India); P. W. Schafer, Ph.D. Virginia; F. W. Stallmann, Ph.D. California (Berkeley); W. R. Wade, Ph.D. California (Riverside).


Math 3050, 3060, 3090, 3100, 3110, 3310, 3320, 3330, 3510, and 3720, are intended primarily for students preparing to teach in elementary or secondary schools.

The Department of Mathematics offers courses numbered 3050, 3060, etc. in the Graduate Catalog, which are sometimes offered in special summer institutes for an 8-week period with 4 hrs. credit. Such special courses are designated 3051, 3061, etc.

MATH DEPARTMENT DEGREES

Mathematics

The Master of Mathematics degree is intended primarily for teachers of high school mathematics. Before admission to this program, the applicant must have an (a) certificate for teaching secondary mathematics in at least one of the states of the United States, or (b) three years of successful elementary or secondary school teaching experience. Evidence of the requirement being met must be supplied by the student.

Applications for admission to this program must take the Graduate Record Examination (aptitude portion), and have had at least one year of college mathematics including analytic geometry. The following requirements must be met:

1. Completing 45 hours of course work, of which at least 9 must be at the 5000 level. Each course work must include:
   a. 36 hours of mathematics courses numbered above 3050.
   b. 9 hours of additional work from mathematics courses numbered 3050 or above from courses in the following departments selected in consultation with the advisor.

2. Passing a comprehensive examination upon completion of all course work.

THE MASTER’S PROGRAMS

The Master of Arts degree and the Master of Science degree are designed to prepare students for industrial employment. The department must have either at the high school and junior college level. The department offers two options for these degrees. The first option requires a thesis for which 9 credit hours must be earned along with 36 additional hours of work in acceptable courses numbered above 4000. Of the additional hours, 9 may be in an area outside the department and 18 must be in courses in mathematics numbered above 5000. After two quarters of graduate study, a student whose supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 4000 are required. Of these, 27 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the 45 hours, 15 in courses approved by the supervisory committee may be taken in fields other than mathematics. For this option, it is also required that a written comprehensive examination be passed, and that credit be received for a 3-hour seminar or reading course (6990-9995) in which a term paper or project is required. A student offering mathematics as a minor for the Master’s degree is required to obtain at least 9 hours of resident graduate credit in courses numbered above 4000 and approved by both the major department and the Department of Mathematics.

THE DOCTORAL PROGRAM

For the Ph.D. in Mathematics the student must meet the following requirements:

1. Pass written examinations covering four of the following subjects to the extent indicated by the accompanying course numbers and such other topics as the graduate faculty may prescribe:

The student must pass at least two examinations from Group a: anyone passing two examinations from Group b will be required to take an approved one-year graduate course (numbered 5000 or above), in which mathematics is extensively used, outside of the mathematics department, and not cross-listed as a mathematics course.

2. Pass an intensive examination in the student’s area of specialization.

3. Demonstrate a reading knowledge of two of the following languages: French, German, Russian; an approved alternative. At least one language requirement must be met before taking a written exam in the student’s third area and the second language requirement met before taking the exam in the student’s area of specialization.

4. Complete an approved one-year 6000-level course in mathematics outside the area of specialization.

5. Complete a dissertation consisting of original and significant research.

6. Pass a final oral examination. Study in a cognate field is not required by the mathematics department.

Registration in any course in the 6000 series may be repeated for credit with the permission of the department.

*3050 Elementary Probability and Statistical Analysis (3) Combinatorial problems; sample spaces, sets, and events; statistical independence; axiomatic probability theory; random variables and their distributions; simple random processes. Prereq: 1550-60 or equivalent.


*3099 Polynomials and Rings (3) An introduction to abstract algebra, beginning with study of integers followed by more general notion of rings, integral domains, and fields. Emphasis is placed on the properties of certain ring theoretic properties shared by integers and polynomial rings over certain fields. Prereq or coreq: 3100 or consent of Instructor.

3100 Logic and Sets (3) Elements of mathe-
3220 History of Mathematics (3) Survey of develop-
ment of various branches of mathematics, from ancient to modern times. Prereq: 1860 or 2560 or equivalent.

3310 Advanced Euclidean Geometry (3) Triangles and circles, constructions, modern concepts. Prereq: 1 yr of college mathematics.

3320 Non-Euclidean Geometry (3) Foundations of hyperbolic and spherical geometries, non-Euclidean plane geometry. Prereq: 1 yr of college mathematics.

3330 Transformational Geometry (3) Fundamental transformations in Euclidean geometry. Classification and properties of isometries and similarities; symmetries of a polygon; inversions. Prereq: 1 yr of college mathematics.

3510 Intermediate Analysis (3) Primarily for students in secondary mathematics education. Course covers elementary calculus from an advanced viewpoint with emphasis on proofs of basic theorems. Topics covered include limits of elementary set theory, relations and functions, derivatives, definite integral, and fundamental theorem of integral calculus. Prereq: 1550-60 or 1860.

3715 Discrete Structures (3) (Same as Computer Science 3715.)


3780-90 Introduction to Combinatorial Theory (3, 3) Introduction to problems of arrangement and selection in discrete systems. Enumeration by recurrence relations and generating functions, graph theory, finite geometries and finite fields, partitions, block designs. Prereq: 2860 or consent of instructor.

3810 How to Prove It (3) Course is designed to improve understanding of nature and methods of mathematical proof by means of practice and participation in seminar setting. Variable content but will include certain standard topics such as direct and indirect proofs, existence proofs, and use of counterexamples. Prereq: 2860 or consent of instructor.

3900 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

4050 Matrix Algebra and Applications (3) Matrices, elementary operations, systems of linear equations, vector spaces, determinants, eigenvalues and eigenvectors. Prereq: 2850 or 2560 or consent of instructor.

4060-70 Matrix Algebra and Applications (3, 3) Eigenvalues and eigenvectors, singular values and singular vectors, unitary and similarity transformations, classical forms, vector and matrix norms, Jordan canonical form, and related topics. Prereq: 2860 or 2560.

4120 Linear Algebra (3) Abstract vector spaces, linear transformations, eigenvalues and eigenvectors, diagonalization of symmetric matrices, forms and vector and matrix norms, Jordan canonical form, and related topics. Prereq: 2860 or 2560.

4150-60 Abstract Algebra (3, 3) Equivalence relations and partitions, properties of integers, elementary theory of groups and rings, polynomial rings, integral domains, divisibility, unique factorization domains, fields. Must be taken in sequence. Prereq: 2860 or 4050.

4225 Numerical Solution to Equations and Numerical Approximations (3) Numerical solution to equations involving one variable, introduction to computation, instabilities, rounding errors. Solution of a single nonlinear equation; introduction to linear and nonlinear systems. Polynomial equations; power and inverse power methods for eigenvalues. Approximation of functions; interpolation polynomials, trigonometric and rational functions. Prereq: 3150 or 3155. (Same as Computer Science 4245.)


4510-20-30 Introduction to Analysis (3, 3, 3) Real number system, functions, sequences, limits, continuity, uniform continuity, differentiation, integration. Functions of several variables, implicit function theory. Multiple integrals, infinite series, sequences and series of functions, uniform convergence. Taylor series. Should be taken in sequence. Prereq: 2860.

4540 Infinite Series and Functions of Several Variables (3) General theory, power series and Taylor's formula, uniform convergence. Partial differentiation and maxima and minima for functions of several variables. LaGrange multipliers. Prereq: 2860.

4550 Partial Differential Equations (3) Fourier integrals, orthogonal functions; the vibrating string; solution by series; heat flow. Bessel functions. Prereq: 2860. Recommended prerequisite: 4610.

4610-20-30 Ordinary Differential Equations (3, 3, 3) 4610—Linear first- and second-order equations. Power series solutions and Legendre polynomials; Frobenius method, and Bessel equations. Systems of linear differential equations and the matrix exponential, 4620—Numerical methods for ordinary differential equations including one-step methods (Euler, Runge-Kutta) for initial value problems, multistep methods, A-stability, and two-point boundary value problems. 4630—Special topics which may include existence and uniqueness, oscillation theory, Liapunov stability, singular perturbations, and asymptotic solutions. Prereq: 4610: 2860 or 4050; 4620: 4050 or 2860; and 3150 or 3155, 4630: 4610 or consent of instructor.

4640 Calculus of Finite Differences (3) Real differential equations, application to problems in engineering and physics. Prereq or coreq: 4610.

4650-60-70 Introduction to Mathematical Statistics (3, 3, 3) Introduction to probability; discrete and continuous distributions; correlation, regression, and statistical independence; foundations of sampling theory, significance tests. Must be taken in sequence. Prereq: 4610.

4710 Vector Analysis (3) Fundamental operations, basis vectors, dot and cross products, directional derivatives, divergence and curl of vector fields, flux through a surface, integrals, Green's theorem, divergence theorem of Gauss, and Stokes's theorem. Prereq: 2860.
and systems of natural deduction; algebraic logic; model of first-order theories; elementary model and recursion theory; consistency, completeness, decidability.

5110-20-30 Theory of Functions of a Complex Variable (3, 3, 3) Complex numbers; infinite series; analytic functions; conformal mappings; analytic continuation; special functions; Riemann surfaces. Prereq: 4510-20 for 5110; 4530 for 5120. Must be taken in sequence.


5210-20-30 Theory of Functions of a Real Variable (3, 3, 3) Sets and real valued functions in Euclidean spaces; abstraction of these concepts, Lebesgue measure and integration; abstract theory and integration. Classical function spaces, such as LP spaces. Generalized Fourier series theory. Special topics. Prereq: 4510-20-30. Must be taken in sequence.

5240-50-60 Linear Algebra (3, 3, 3) Metric spaces, finite and infinite dimensional Banach and Hilbert spaces, linear operators, vector and operator norms, spectral theory. Examples to be chosen from relevant applied areas. Prereq: 4510-20-30.


5310-20-30 Introduction to Higher Geometry (3, 3, 3) Projective spaces; coordinates and transformations; conics and quadrics. Elliptic and hyperbolic geometry from viewpoint of projective geometry. Prereq: 4510-60. Must be taken in sequence.


5450-60-70 Introduction to Partial Differential Equations (3, 3, 3) Linear second-order equations, separation of variables, and Fourier series, nonhomogeneous equations, higher order equations, multiple Fourier series, Fourier and Laplace transforms. Prereq: 4510-20-30 and 4610 or consent of instructor.

5465 Finite Element Methods (3) Finite element techniques for solution of ordinary and partial differential equations: variational principles, local bases, rates of convergence, and computer implementation. Prereq: 3150 or 3155, and 4225 or consent of instructor. (Same as Computer Science 5465.)

5475 Advanced Topics in Numerical Partial Differential Equations (3) Advanced topics in numerical solution of partial differential equations. FEM for elliptic, parabolic, and hyperbolic problems. Boundary value problems with singularities. Other topics, such as special methods, further study of FDM, etc. at discretion of instructor. Prereq: 4545-65. (Same as Computer Science 5475.)

5490-50-60 Mathematical Programming (3, 3) Optimization of functions or variables subject to constraints. Prereq: 3150, 4060 and 4530.

5510-20-30 Introduction to Higher Algebra (3, 3, 3) Algebraic systems: groups, rings, integral domains, fields. Must be taken in sequence.

5540 Galois Theory (3) Fields and their extensions, separable and normal extensions, algebraic closure, groups of automorphisms, fundamental theorem, solvability of equations, by radicals. Prereq or coreq: 5520.

5650-70-80 Theory of Matrices in Numerical Analysis (3, 3, 3) Matrix identities and inequalities: Factorization theorems, generalized reciprocals, Hadamard inequalities, Lanzos' algorithm, eigenvalues, norms, convergence, domains of inclusion and exclusion of roots of matrices; the field of values; minimal and maximal theorems for Hermitian matrices; Kantorovich inequalities. 5580—Computational methods for inverting matrices, direct and by successive approximation; methods of reduction to normal form; successive approximations to roots of matrices; measures of error. Prereq: 4510-20-30.

5590 Theory of Rings (3) Direct and subdirect sums of rings, prime and maximal ideals, radical, and homomorphisms. Prereq: 5540.

5610-20-30 Mathematical Methods in Physics (3, 3, 3) (Same as Physics 5610-20-30.)

5640 Numerical Methods in Physics (3) (Same as Physics 5640.)

5665-65-75 Numerical Mathematics (3, 3, 3) Numerical solution of large systems of linear algebraic equations, systems of nonlinear equations and algebraic eigenvalue problems. Prereq: 4545 or 4235. (Same as Computer Science 5665-65-75.)

5710-20-30 Tensor Analysis (3, 3, 3) Absolute differential calculus; local Euclidean space; differential geometry of curves and surfaces; applications to physics; extension to n-dimensional spaces. Prereq: 4510-20-30. Must be taken in sequence.


5800-30-40 Advanced Topological Dynamics (3, 3) Advanced topics in topological dynamics. Prereq or coreq: 5810-20-30 and 5820-20-30 or consent of instructor.

5840-50-60 Mathematical Ecology (3, 3, 3) Discrete and continuous models in ecology. Population models; predator-prey, competition, parasite-host, food chains, and food webs. Stochastic growth models, random model effects. Comparison of stochastic with deterministic models. Prereq for 5840-50: 4510, 4550 or consent of instructor; prereq for 5860: 4750 or 4850 or consent of instructor.


5970-80 Mathematical Systems Theory (3, 3) Analytical approach to discrete and continuous dynamical systems, fundamentals of control theory, linear problems, linear perturbation theory, nonlinear analysis, sensitivity and stability aspects, applications to ecological systems, role of high-dimensional and complex systems. Prereq: 4510-20-30. Must be taken in sequence.

6000 Doctoral Research and Dissertation 6210-20-30 Linear Analysis (3, 3, 3) Algebraic and topological properties of linear spaces, emphasis on normed linear spaces, dual spaces; linear transformations; special topics (spectral theory, ergodic theory, semi-groups of transformations); applications to problems in analysis. Prereq: 4510-60 and 5210-20-30. Must be taken in sequence.

6450-60-70 Partial Differential Equations (3, 3, 3) Advanced topics in classical and modern theoretical partial differential equations. Prereq or coreq: 5110-20-30 and 5210-20-30 or consent of instructor.

6510-20-30 Modern Algebra (3, 3) Intensive study of some major branch of algebraic theory. Subject matter will vary according to interests and preparation of students. Prereq: 5510-20-30.

6540-50-60 Theory of Semigroups (3, 3, 3) Conjugacy of semigroups, prime and maximal ideals; representation theory; decompositions, and extensions; free, regular, inverse, simple, and completely simple semigroups. Prereq: 5520.

6570 Theory of Groups (3) Structure of groups, free groups, nilpotence and solvability, extensions and products, permutation groups, abelian groups. Prereq: 5520.

6610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) Theory of ordinary differential equations from advanced viewpoint. Topics from current literature. Subject matter varies according to interests, preparation of students. Prereq or coreq: 2610 or 4610, 4510-60, and 5110-20-30 or 5210-20-30 or consent of instructor.

6750-60-70 Probability Theory (3, 3) Treatment of probability as a branch of measure theory. Probability spaces, random variables, general theory of distribution functions and their transforms; boundary value problems for linear systems; regular and singular perturbation theory for nonlinear systems. Prereq or coreq: 4510-60 or 4610-60 or consent of instructor.


6800-20-30 Topological Algebra (3, 3, 3) Topics chosen from topological semigroups, topological...
groups, Lie groups; transformation groups; topological lattices; relations in topological spaces; topological rings, fields, algebras. Prereq or coreq: 5910-20-30.

6910-20-30 Modern Topology (3, 3, 3) Technical background to current literature in topology. Topics vary from year to year.

6940-50-60 Introduction to Algebraic Topology (3, 3, 3) Homology, cohomology, and homotopy theories. Homology and cohomology groups, the Eilenberg-Steenrod axioms, cup and cap products, duality theorems, homotopy equivalence, higher homotopy groups, fiber spaces, special sequences. Prereq: 4160 and 5920.

6991 Seminar Analysis (1-3)
6992 Seminar Topology (1-3)
6993 Seminar Algebra (1-3)
6994 Seminar Foundations (1-3)
6995 Seminar Applied Mathematics (1-3)

Registration for seminars may be repeated with consent of department.

Microbiology

MAJOR

DEGREES

Microbiology

M.S., Ph.D.

Professors:

G. Brown (head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; T. C. Monie, Ph.D. Maryland; D. V. Haltiner, Ph.D. Kansas; J. M. Woodward, Ph.D. Kansas; C. J. Wust, Ph.D. Indiana.

Associate Professors:


Assistant Professors:

D. A. Bemis, Ph.D. Cornell; D. A. Brian, Ph.D., D.V.M. Michigan State; G. S. Sayer, Ph.D. Idaho.

Lecturers:


Students planning to major in Microbiology are expected to present, as undergraduate prerequisites, a minimum of one year of biology, one year of mathematics including calculus, two years of chemistry and one year of physics.

The student's dissertation committee determines whether a foreign language is required for the doctoral degree.

3810 Food Bacteriology (4) Standards for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Prereq: 2910 and Chemistry 2320 or 3211. 2 hrs and 2 labs.

3820 Yeast and Molds (4) Morphology, taxonomy, and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: 2910 and Chemistry 2320 or 3211 or consent of instructor. 2 hrs and 2 labs.

4110 Physiology of Bacteria (2) Modern concepts of bacterial physiology and metabolism including regulation of cell function. Prereq: 3510 and 12 hrs of organic chemistry.

4118 Bacterial Physiology Laboratory (2) Prereq: 3519. Coreq: 4110.

4130 Taxonomy of Bacteria (3) Bacterial classification. Prereq: 3510-19.

4140 Molecular Genetics of Prokaryotes (2) Transmission and expression of genetic information at the molecular level. Emphasis is on bacterial and viral systems, but unique features of euayrkyotic genetic systems are included. Prereq: 3510 or consent of instructor.

4150 Microbial Ecology (3) Application of ecological principles to study of microbial communities. Emphasis on functional role of microorganisms in natural environments. Prereq: 3510, 1 yr of organic chemistry, Biology 3130, or consent of instructor.

4270 Advanced Immunology (2) Chemistry of antigens and haptens, theories of antibody formation, cell cooperation in immune mechanisms, transplantation, abnormalities of the immune system, and autoimmune diseases. Prereq: 3520 or consent of instructor. (Same as Zoology 4270.)

4279 Advanced Immunology Laboratory (2) Laboratory exercises designed to accompany 4270. Prereq or coreq: 4270.

4320 Pathogenic Bacteriology (2) Disease-producing microorganisms including bacteria, ricketsias, and chlamydiae. Prereq: 3530.


4330 Medical Mycology (2) Disease-causing fungi; cytology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq: 3536 and 3629.

4339 Medical Mycology Laboratory (2) Prereq: 3619. Coreq: 4330.

4420 Molecular Virology (2) Molecular aspects of the replication, assembly and expression of viruses, with emphasis on bacteriophage. Prereq: 3510.

4430 Medical Virology (2) General virology with emphasis on medical aspects. Prereq: 3530.

4439 Medical Virology Laboratory (2) Laboratory procedures for isolation, handling and culturing of animal viruses. Prereq: 3539. Coreq: 4430.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5101-12-13-14-15-16 Mini-course in Microbiology (1, 1, 1, 1, 1, 1) Selected, advanced topics in microbiology, concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: as posted. May be repeated. Maximum 9 hrs. S/NC only.

5130 Topics in Taxonomy (3) Isolation, cultivation and taxonomic relationships of achromatous bacteria; emphasis upon less frequently encountered orders. Prereq: 4130. 3 labs.

5510 Selected Topics in Microbiological Research (3) Literature surveys and laboratory methods for development and interpretation of microbiological research. May be repeated.

5560 Topics in Immunology and Immunohematology (4) Topics in molecular and cellular immunology and immunohematology. Prereq: 4270; Biochemistry 4110-20 or equivalent. Prereq: 2910. 20-40 credit hours.

5592 Clinical Immunology (4) Clinical aspects of immune phenomena. Prereq: 4270; Biochemistry 4110-20 or equivalent. 20-40 credit hours.

5594-54-55-56 Clinical Microbiology (6, 6, 6, 6) Six quarters, 6 quarter hrs each consisting of lectures and clinical laboratory experiences. Enrollment by consent of department head.

5595-50-53 Research Problems (3, 3, 3) Prereq: 5592 or 5594. May be repeated with consent of department.

5599 Internship in Microbiology (1-6) Internship in microbiological research. May be repeated. S/NC only.

5730 Pathogenesis of Infectious Disease (3) Host response to infection. Derangement of host-metabolism involved by microbial invasion, exotoxins, endotoxins and other factors related to virulence. Alteration of genetic and hormonal controls resulting from progressive infection. Prereq: 4320.

5750 The Oncogenic Viruses (3) Lectures and special laboratory exercises dealing with known tumor-inducing viruses. Prereq: 4430 or consent of instructor. 2 hrs and 1 lab.

5760 The Bacterial Viruses (3) Lectures and discussions dealing with bacterial viruses with emphasis on the biological and chemical consequences of bacteriophage infection. Text supplemented by readings from literature. Prereq: 4420; Biochemistry 4110-20 or consent of instructor.

5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetics concepts (mutation, complementation, recombination) at molecular level. Studies of lactose operon of E. coli. Prereq: 4140 and Biochemistry 4110-20 or consent of instructor.

5820 Microbiology of Foods (3) Lectures and seminars dealing with current advances and selected topics in food microbiology with emphasis on analytical methods, safety and preservation. Prereq: 3619 and Biochemistry 4110-20. Recommended: Food Technology 4900.

5829 Experimental Microbial Ecology (3) Survey of techniques for assessment of microbial forms, functions, activities, and interactions in a variety of habitats. Prereq: 3519. Coreq: 4150 or consent of instructor. 1 hr and 2 labs.

5850 Seminar in History of Microbiology (1) Microbiologists and their achievements from Pasteur to present. S/NC only.

5910-20-30 General Seminar (1, 1, 1) Reviews of current literature. May be repeated with consent of department. S/NC only.

6000 Doctoral Research and Dissertation

6310 Seminar in Immunology (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6320 Seminar in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6330 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6340 Seminar in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6350 Seminar in Virology (1) Readings and discussions based on current literature. May be repeated with consent of department. S/NC only.

6360 Seminar in Filamentous Fungi (1) Readings and discussions based on current literature. May be repeated. Maximum 9 hrs. S/NC only.

6370 Current Topics in Environmental Microbiology (2) Reading, discussions, and critical evaluation of current literature. May be repeated. Maximum 9 hrs. S/NC only.

6410 Concepts of Immunity (3) Discussion and readings of recent advances in immunobiology and immunopathobiology.

6720 Advanced Topics in Microbial Physiology (3) Prereq: 5720. May be repeated with consent of department. S/NC only.

6730 Advanced Topics in Microbial Pathogenesis (3) Prereq: 5730. May be repeated with consent of department.

6740 Advanced Topics in Virology (3) Prereq: 4420 or 4430. May be repeated with consent of department.

6760 Advanced Topics in Microbial Genetics (3) Prereq: 6340. May be repeated with consent of department.
The Department of Music offers the degrees of Master of Music with concentrations in performance, composition, literature/techniques, music research, and music electives.

Applicants for these degree programs must have completed an undergraduate degree approximately equivalent in music requirements to those required in degrees conferred by The University of Texas at Austin. Applicants are expected to have completed a major in Music with concentrations in performance, literature/techniques, and music electives.

Candidates for the Master of Arts degree must have the approval of the student's advisor. Students must have completed an undergraduate major in Music with concentrations in performance, literature/techniques, and music electives.

The College of Liberal Arts 127

College of Liberal Arts 127

4114 Stage Band Arranging (3) Analysis of scores and scoring for the stage band. Prereq: 3112 or consent of instructor.

4115 Variation (3) Study and application of techniques employed in scoring for the concert orchestra. Prereq: 3112 or consent of instructor.

4124 Band Arranging (3) Study and application of techniques employed in scoring for the marching and concert bands. Prereq: 3112 or equivalent.

4134 Band Transcription (3) Technique and application of transcribing keyboard and orchestra rhapsodies for concert band, military band, and chorale. Prereq: 3112 or equivalent.
4210 Music in the Romantic Period (3) Survey of music from Beethoven through post-romantic instrumental and vocal styles.

4239 Contemporary Music: 1945 to Present (3) Survey of new and avant-garde music in Europe and America since World War II.

4241 American Music (3) American music from colonial days to present. Emphasis on twentieth century. Includes both folk and cultivated traditions. Prereq: 1210-20 or equivalent.


4290 Gregorian Chant (3) Chants of Latin rite. Masses and Offices examined as functional music as well as by type.

4310 History of Art Song (3) Survey of art song from late eighteenth century to 1930.

4315 Wind Chamber Music (3) Study of wind chamber music from eighteenth through twentieth century. Emphasis placed on style interpretation, rehearsal techniques, programming and musical significance, both historical and theoretical.

4430-50 Works of Bach (3, 3) Detailed examination of operas, chamber music, and orchestral works; cantatas, motets, passions and oratorios. 4530-50-instrumental works; 4530—vocal works.

4400 Jazz Directing (1) Rehearsal techniques for jazz ensembles: special conducting techniques, rehearsal procedures, library resources. Special consideration of supervised laboratory experience in rehearsing university jazz bands. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4840 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz and administering of jazz program. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4850 Jazz Composition (3) Pre req: Music 4114 and consent of instructor.

4860 Advanced Improvisation (2) Emphasis on further development of individual skills and solving individual problems in jazz improvisation. Prereq: 3952-53.

5000 Thesis


5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5010 Organ Literature Seminar (3) Topics vary. Prereq: Organ literature.

5012-22-32 Pedagogy of Voice (2, 2, 2) 5012—Survey of voice production processes in singing including: voice classification, quality, diction registration, breath support, and control. 5022—Examination of teaching materials, preparation of programs for various vocal categories and levels of study. Observation of studio teaching. 5032—Analysis of the vocal problems of a selected group of students. Supervised teaching. Prereq: 4012-22-32 or consent of instructor.


5030 Choral Literature Seminar (3) Topics vary.

5040 Vocal Literature Seminar (3) Topics vary.

5050 Graduate Recital (3)

5051 Opera Performance (3)

5052 Vocal Chamber Music Performance (3)

5053 Choral Conducting Performance (3)

5055-56 Practicum for Instrumental Conductors (1-3) Intern experience in instrumental music and in an instrumental field other than the area of major interest. S/NC only.

5057 Instrumental Conducting Seminar (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 4050 or equivalent.

5060 Seminar in Choral Performance (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 4050 or equivalent.

5070 Opera Production (1-3) Prereq: Consent of instructor.

5080 Instrumental Conducting Performance (1) Jury performance; conducting band or orchestra in public.

5080 Special Topics in Performance (1-3) Prereq: Consent of department head.

5100 Independent Study in Music Theory (1) Prereq: Consent of department head.

511 Advanced Harmony (3) Analytic survey of harmonic trends in compositions from 1700 to present. Exercises employing and illustrating these techniques. Prereq: Consent of instructor.

5114 History of Music Theory (3) Work and contributions of theorists from ancient Greece to present. Emphasis on 1600 to present. Prereq: Consent of instructor.

5116 Musical Styles (3) Elements of design and their role in definition of musical styles. Exercises in aural and visual identification. Prereq: Consent of instructor.

5121 Analytical Techniques (3) Analytical techniques with emphasis on contemporary approaches. Tonal and atonal music. Prereq: Consent of instructor.

5125 Practicum in Computers and Music Research (3) Programming languages, design, and implementation of projects in musical analysis, composition and indexing. Prereq: Consent of instructor.

5150 Seminar in Music Theory (3) Topics vary. Prereq: Consent of instructor.

5200 Independent Study in Music History and Literature (1-3) Prereq: Consent of department head.

5210 Introduction to Music Research (3)

5220 Proseminar (3) Research techniques in music emphasizing bibliography, writing of research papers and presentation of oral reports. Prereq: Consent of instructor.

5270 Seminar in Musicology (3) Topics vary. Prereq: Consent of instructor.

5315 Band Literature (3) Band literature and origins of band emphasizing its important, expanded cultivation during past century in United States and Europe.

5350 Music in the Middle Ages (3) Emphasis on early Christian chant, medieval secular song, early theory, and the development of polyphony and musical notation.

5352 Music in the Renaissance (3) From 1400 to 1600. Mass, motet, chansons, madrigal, and other vocal and instrumental forms and genre.

5353 Music in the Baroque Period (3) From 1600 to 1750; rise of opera and oratorio, church and secular cantata, instrumental forms, performance practice.

5355 Music in the Classic Period (3) Preclassic music (Rococo) and music of Haydn, Mozart and early Beethoven. Includes background of other cultural and artistic activities.

5400 Musical Aesthetics (3) Nature of music and musical experience, sense perception and emotions, value in music, and role of artist in society. Aesthetic viewpoint of individuals and historical era through selected writings.

*5500 Flute (1-4)

*5505 Oboe (1-4)

*5510 Bassoon (1-4)

*5515 Clarinet (1-4)

*5520 Saxophone (1-4)

*5525 Horn (1-4)

*5530 Trumpet (1-4)

*5535 Trombone (1-4)

*5540 Baritone (1-4)

*5545 Tuba (1-4)

*5550 Percussion (1-4)

*5555 Voice (1-4)

*5560 Violin (1-4)

*5565 Viola (1-4)

*5570 Cello (1-4)

*5575 String Bass (1-4)

*5580 Piano (1-4)

*5585 Harpsichord (1-4)

*5590 Organ (1-4)

*5595 Guitar (1-4)

*5597 Composition with Electronic Media (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

*5599 Composition (1-3) Prereq: Consent of instructor.

*5560 Small Ensemble (1)

*5562 Brass Choir (1)

*5564 Jazz Ensemble (1)

*5568 Trombone Choir (1)

*5570 Percussion Ensemble (1)

*5572 Baroque Ensemble (1)

*5574 UT Singers (1)

*5580 Chamber Singers (1)

*5582 Collegium (1)

*5584 Saxophone Choir (1)

*5584 Opera Theatre (1)

*5584 Opera Workshop (1)

*5585 Concert Band (1)

*5585 Campus Band (1)

*5586 Varsity Band (1)

*5587 Laboratory Band (1)

*5587 Marching Band (1)

*5587 Symphony Orchestra (1)

*5588 Concert Choir (1)

*May be repeated.
Philosophy

MAJOR

Philosophy

DEGREES

M.A., Ph.D.

Professors:

J. W. Davis (Head), Ph.D. Emory;
R. B. Edwards, Ph.D. Emory; M. H. Moore (Emeritus), Ph.D. Chicago; D. Van de Vate, Jr., Ph.D. Yale.

Associate Professors:

R. E. Aquilla, Ph.D. Northwestern;
G. G. Barenkot, Ph.D. Michigan; L. D. Cebik, Ph.D. Nebraska; G. Grable, Ph.D. Michigan;
C. B. Postow, Ph.D. Yale.

Assistant Professors:

J. O. Bennett, Ph.D. Tulane; S. M. Cohen, Ph.D. Northwestern; K. A. Emmett, Ph.D. Ohio State;
H. P. Hamlin, Ph.D. Georgia; R. Jones, Ph.D. Chicago; S. Reaven, Ph.D. California (Berkeley).

THE MASTER'S PROGRAM

See general requirements on page 19. Courses below 4000 may not be taken for graduate credit by philosophy majors except with special permission.

THE DOCTORAL PROGRAM

Specific requirements for doctoral students in Philosophy include a minimum of three academic years of graduate study involving at least 72 quarter hours credit in course work (normally 24 quarter courses or their equivalent, exclusive of credit for the thesis and dissertation) of which at least 45 shall be in courses numbered over 5000, and of which at least 9 shall be in a subject other than philosophy. The specific number and distribution of courses will be determined by the student's faculty committee. Two foreign languages, normally French and German, are required. As an alternative to the two-language requirement, candidates for the Ph.D. may elect to demonstrate a substantially more advanced proficiency in reading knowledge of one language. Requirements for this option may be obtained in the department office.

In any course in the 5000 or 6000 series (except 5050 and 5910-20-30) may be repeated for credit with the consent of the department. That is, courses having the same number, but with different subject matter, may be taken with each separate subject description.

MEDICAL ETHICS

The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Details concerning the program can be obtained from the department.

RELIGIOUS STUDIES

The department has an M.A. program of graduate study with a concentration in philosophy of religion and other religious studies. Details concerning the program can be obtained either from the Departments of Philosophy or Religious Studies.

3111 Ancient Western Philosophy (4)
3121 Medieval Philosophy (4)
3131 Seventeenth- and Eighteenth-Century Philosophy (4)
3141 Nineteenth- and Early Twentieth-Century Philosophy (4)
3151 Contemporary Philosophy (4) Survey of recent movements in philosophy.
3270 Russian Philosophical and Theological Thought (4) (Same as Religious Studies 3570 and Russian 3720.)
3311-12 American Philosophy (4, 4) 3311—Colonial to late nineteenth century. 3312—Late nineteenth century to present.
3320 Philosophy of Law (4) Nature, sources, function of law.
3330 Philosophy of History (4) Speculative and critical aspects of the philosophy of history.
3410 Philosophical Ideas in Literature (4) Philosophical assumptions and implications in major literary works.
3420 Philosophy of Literature (4) Study of the nature, functions, value and epistemological principles of literary art.
3430 Concepts of Woman (4) Examination of some of the theoretical foundations of feminism and antifeminism.
3440 Social Ethics (4) Ethical theory as related to politics, economics, law, religion and the family.
3510 Existentialism (4)
3550 Marxism as Philosophy (4)
3650 Philosophy and Religion in India (4) (Same as Religious Studies 3650.)
3740-50 Conceptual History of Science (4, 4) 3740—The Scientific Revolution: historical evolution of thought on the nature of matter and of light, and on that of life. Prereq: 8 hrs of physical science or consent of instructor.
3750 Philosophy of Logic (4) Nature of logic; principles of reasoning. Prereq: 4510 or equivalent.
3770 Introduction to Philosophy of Science (4) Standard topics in philosophy of science: scientific method, nature of laws and theories, problem of induction, explanation, measurement. No background in logic presupposed.
3810 Introductory Symbolic Logic (4) Techniques for formal analysis of deductive reasoning (propositional logic and quantification theory).
3910 Contemporary Aesthetics (4) Philosophical discussion of contemporary art.
4000 Special Topics (4) A student- or instructor-initiated course to be offered at convenience of department. Subject matter to be determined by mutual consent of students and instructor with approval of department. Prerequisites to be determined by department. May be repeated.
4111-21 Modern Religious Philosophies (4, 4) (Same as Religious Studies 4111-21.)
4310 Intermediate Ethics (4) Topics in metaethics or ethics.

5550-60 Philosophy of Science (4, 4) Nature of subject matter and method of sciences. 5550—Natural sciences. 5560—Social sciences.

5610 Recent Developments in Philosophy of Religion (4)

5710 Studies in Metaphysics (4) Metaphysics of philosopher or systematic philosophic tradition.

5810 Social and Political Philosophy (4)

5910-20-30 Research (4, 4, 4) Independent study under direction of member of department.

5950 Clinical Practicum in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/N/C only.

6000 Doctoral Research and Dissertation

6110-20-30 Seminars in the History of European Philosophy (4, 4, 4)

6150 Seminars in the History of American Philosophy (4)

6250 Seminar in the Philosophy of Religion (4)

6310 Seminar in Axiology (4)

6370 Advanced Topics in Medical Ethics (4) Prereq: 5370 or consent of Medical Ethics Committee.

6510 Seminar in Epistemology (4)

6550 Seminar in Philosophy of Science (4)

6850 Advanced Residence in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/N/C only.

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**Physics and Astronomy**

**MAJOR DEGREES**

**Physics** M.S., M.ACT, Ph.D.

**Professors:**
- W. M. Bug (Head), Ph.D. Tennessee;
- C. R. Bingham, Ph.D. Tennessee;
- R. D. Blinthoff, Ph.D. Northwestern;
- M. A. Brauzdale, Ph.D. Michigan State;
- T. A. Callcott, Ph.D. Purdue;
- L. G. Chastatourou, Ph.D. University of Manchester;
- G. F. Condo, Ph.D. Illinois;
- W. E. Davis, Ph.D. Ohio State;
- J. D. Dicky, Ph.D. Vanderbilt;
- J. L. Fowler, Ph.D. Princeton;
- N. M. Gailier, Ph.D. Ohio State;
- J. H. Gibbons, Ph.D. Duke;
- E. G. Harris, Ph.D. Pennsylvania;
- D. T. Kings, Ph.D. British University (England);
- R. J. Lowell, Ph.D. Vanderbilt;
- A. A. Merson, Ph.D. Tennessee;
- A. H. Niven, Ph.D. Michigan;
- F. E. Obenashen, Jr., Ph.D. Pittsburgh;
- R. D. Present, Ph.D. Harvard;
- R. H. Ritchie, Ph.D. Tennessee;
- H. C. Schweinfe, Ph.D. Massachusetts Institute of Technology;
- J. M. Sellin, Ph.D. Chicago;
- H. P. Stimson, Ph.D. Massachusetts Institute of Technology;
- T. O. Thompson, Ph.D. Illinois;
- A. T. Walton, Ph.D. Illinois;
- J. W. White, Ph.D. North Carolina.

**Associate Professors:**
- L. Adler, Ph.D. Tennessee;
- W. E. Blass, Ph.D. Michigan State;
- R. W. Childers, Ph.D. Vanderbilt;
- J. C. Condon, Ph.D. Colorado State;
- H. W. Crater, Ph.D. Yale;
- E. D. Duckett, Ph.D. Pennsylvania;
- W. A. Dunn, Ph.D. Florida;
- O. C. Elderidge, Ph.D. California (Berkeley);
- S. Georgiou, Ph.D. Manchester (England);

**Assistant Professors:**
- M. F. Fair, M.S., Michigan;
- M. M. Guidry, Ph.D. Tennessee;
- T. H. Hiller, Ph.D. Rutgers;
- R. H. Koll, Ph.D. Ohio State;
- D. L. McCorkle, Ph.D. Tennessee;
- R. S. Thoe, Ph.D. Connecticut.

**Research Associate Professor:**
- R. L. Becker, Ph.D. Yale.

A student who enrolls in the Graduate School with the intention of attaining an advanced degree in Physics shall, in general, have completed an undergraduate major in physics or its equivalent. Physics 3210-20, 3710-20, or 4110-20-30, 4210-20, 4230 or 4240 constitute the minimum courses prerequisite to graduate study.

A student not intending to present Physics as a graduate minor shall, in general, have completed an undergraduate minor in Physics or its equivalent. Physics 3210-20, 4210-20 constitute the minimum courses prerequisite to graduate study.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are offered in a number of specialized fields including chemical physics, elementary particle physics, atomic and low temperature physics, high physics, nuclear spectroscopy, nuclear physics, plasma physics, solid state physics, theoretical physics, ultrasonics, high ion atomic physics, biophysics, and liquid state physics.

Departmental graduate programs providing special opportunities for academic and research work in areas pertinent to atmospheric and space flight are available at the Space Institute, Tullahoma.

All first-year graduate students are required to take a comprehensive examination in undergraduate physics during the fall quarter registration period.

**THE MASTER'S PROGRAM**

The Physics Department has two Master's degree programs—thesis and non-thesis.

The thesis program is primarily designed for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 5110-20-30, 5210-20-30, 5310-20-30, and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

The non-thesis program is primarily designed for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking an M.S. in Physics by this method must apply to the department's graduate committee for permission to follow this program.

The requirements for the M.S. under this method are the satisfactory completion of 45 hours of course work composed of 27 hours from courses numbered above 5000 (4 students, 5210-20-30, 5310-20-30); 9 hours in a minor field (e.g., mathematics); and 9 hours from other courses in physics numbered above 4000 (preferably of advanced laboratory nature). In addition, the candidate must pass a comprehensive examination administered by the committee.

The Physics Department is also participating in the program which leads to the Master of Arts in College Teaching degree. In addition to the requirements for either of the Master's programs described above, the MACT degree in Physics requires 15 more hours of credit, making a total of 80 quarter hours. Nine of these hours are specified as follows: 3 hours in a seminar course dealing with general problems of college teaching; 3 hours in a seminar course dealing with special problems in the teaching of physics; and 3 hours in a course dealing with the history and philosophy of physics. The other 6 hours of course work may be elected from any of the physics courses numbered above 5000. During the two-year program leading to the MACT degree, the candidate will be continually engaged in supervised teaching activities.

**THE DOCTORAL PROGRAM**

All students are expected to take Physics 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30 and 6310. Physics 6210-20-30 are normally required of students specializing in nuclear physics. Physics 6500-10 of students in plasma physics, Physics 6610-20-30 of students in health physics, Physics 6710-20-30 of students in solid state physics, and Physics 6810-20 of students specializing in fluid mechanics and other significant body of literature is required.

German or French 3030 with a grade of A or B may be substituted for the corresponding language examination. The thesis topic will be chosen with reference to one of the fields in which research facilities can be made available either at the University laboratory or at the Oak Ridge National Laboratory, Oak Ridge, Tennessee.

A program leading to the Ph.D. in chemical physics is conducted jointly with the Chemistry Department, which offers a similar degree program. The course and research program requirements for the degree in chemical physics include the successful completion of Physics 4510, 4610-20-30, 5210-20-30, 5310-20-30, 5610-20-30, 6110-20-30, and either 6310 or 5720; Chemistry 4160-70, 5430, and any two quarters from 5340-50, 5460, 5860, 6730 or 6810-20-30.
Astronomy


Physics


3230 Heat and Thermodynamics (3) Concepts of temperature and heat; laws of thermodynamics; applications of laws to simple physical and chemical problems. Prereq: 2320 or 2330 and calculus. 3510-20 or consent of instructor.


3510-20-30 Physical Measurements (3, 3, 3) Laboratory measurement of some physical quantities where necessary. Prereq: 2310-20 or 2310-20-30, and calculus; 3510 for 3520 and 3530. 3 labs.

3610-20 Electronics (3, 3) Electronic components and circuits of interest to physicists. Prereq: 2320 and 2320-20-30. 3 labs.

3630 Nuclear Electronics Laboratory (3) Elementary circuits of interest in nuclear instrumentation are designed and built, and their characteristics are tested as a function of various parameters. Prereq: 3610-20.


4040 Foundations of Physics (3) Selected topics from history and philosophy of classical and modern physics. Prereq: 1 yr general physics and consent of instructor. Required of MACT candidates.


4140 Elementary Nuclear Physics (3) General properties of nuclei, two-nucleon systems, nuclear forces, nuclear models, nuclear reactions, nuclear disintegrations and beta-decay, nuclear spin and magnetism. Prereq: 3730 or 4120.

4180 Physical Acoustics (4) Considerations fundamental to detailed investigation of any branch of acoustics; propagation of acoustic waves in the infrasonic, the audible, the ultrasonic, and the hyperasonic ranges of frequencies. Prereq: 3210-20, 3230. 3 hrs and 1 lab.

4210-20 Electricity and Magnetism (3, 3, 3) Intermediate level electrostatics; steady and alternating currents; laws of electromagnetism; Maxwell’s equations; radiation of electromagnetic waves; reflection and refraction; electromagnetic fields of sources. Magnetic fields will be taken in sequence. Prereq: 2320 or 2220 and Mathematics 2830.

4230-40 Modern Optics (4, 4) 4230—Geometrical Optics. 4240—Physical Optics. 4250—Principles of light and superposition of waves; interference; Fraunhofer and Fresnel diffraction; Fourier optics; holography. Sections 4210 or consent of instructor. 3 hrs and 3 hrs lab.

4510-20-30 Atomic Physics Laboratory (3, 3, 3) Experiments in: fundamental particle properties, photoelectricity, conduction of electricity through atoms, atomic and molecular spectroscopy, x-ray. Prereq or coreq: 3710-20-30. 3 labs.

4540-50 Experimental Nuclear and Radiation Physics (4, 4) Interaction of charged particles and electromagnetic radiation with matter; theory and characteristics of various detectors; statistics of counting, nuclear properties. Experiments illustrate recent techniques for investigating the nucleus and nuclear radiation. Prereq: 2310. 1 hr and 6 hrs lab.

4580 Principles of Nondestructive Testing (3) Detection and characterization of discontinuities in materials by nondestructive physical measurements. Ultrasonic, electromagnetic, holographic and penetrating radiation techniques are discussed. Prereq: 2310-20 or consent of instructor.


5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Non-Faculty directed projects. x-rays, p-n junction, x-rays and gamma rays, neutron activation, interaction of charged particles with matter, stopping power, range-energy relations, counting statistics, shielding, dosimetry, waste disposal, critically prevention, radiation biology and ecology. Prereq: 3730.

5080 Graduate Research Participation (3) Advanced research techniques under supervision of staff research associate. Area coincides with interests of student. Open to all graduate students. May be repeated. S/NC only.

5310-20-50 Experimental Methods of Infrared and Raman Spectroscopy (3) Spectroscopic methods available for solution of physical problems, pointing forward use of automatic computing machinery; analysis of errors. Prereq: 5100-20-30, or consent of instructor. (Same as Mathematics 5640).

5720 Physics of Polystromatic Molecules (3) Introduction to electronic structures and physical processes of luminescence of these molecules; theoretical and experimental aspects of intermolecular and intramolecular electron excitation energy transfer and charge transfer; application of excitation energy transfer and charge transfer in such fields as organic molecular reactivity and organic scintillation. Prereq: 5210-20 or consent of instructor.

5910-30 Special Problems (3, 3, 3) Specially assigned theoretical or experimental work on problems not covered in other courses.

5911-31 Special Problems in the Teaching of Physics (1, 1) Design of physics experiments and demonstrations, construction and analysis of physics tests and examinations, techniques in presentation of physics topics, and related problems. Prereq: Consent of instructor. Required of MACT candidates.

5990 Seminars (1-3) (a) Mechanics; (b) Radiation; (c) Heat and Thermodynamics; (d) Electricity and Magnetism; (e) Modern Physics. May be repeated with consent of department. Maximum 27 hrs.

6000 Doctoral Research and Dissertation

6110-20-30 Quantum Mechanics (3, 3, 3) Fundamental principles of quantum mechanics and principal approximation methods. Applications to atomic and molecular quantum mechanics. Dirac equation; quantum electrodynamics. Prereq: 4130 or 5210. 6130-20-30 or 5410-20. Which ever of latter series may be used as prerequisite is considered corequisite.


ties of gases and solids. Optical properties of electromagnetic waves in isotropic media including reflection, refraction and polarization and also theory of diffraction. Prereq: PHYS 5410-20-30.

8320 Special Relativity (3) Lorentz transformations; Einstein postulates; relativistic tensors; relativistic mechanics; relativity, electrodynamics. Prereq: PHYS 5310-20-30, 5410-20-30, 5810.

8330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prereq: PHYS 8320.

8410 Advanced Topics in Classical Theory (3) To meet special needs of students. Possible fields: advanced dynamics and hydrodynamics; electromagnetic theory, statistical mechanics, theory of nonequilibrium. Prereq: PHYS 5310-20-30, 5410-20-30, 5510-20-30. May be repeated with consent of department.

8430 Advanced Topics in Quantum Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence, scattering and collision processes, theory of nuclear forces. Prereq: PHYS 8130-20-30. May be repeated with consent of department.

6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) Electrical conduction in gases and plasmas. Characteristics of spark and glow discharges. Collective phenomena in a plasma; plasma oscillation; magneto-atomic processes; instabilities. Topics of current interest in astrophysics, geophysics and thermonuclear research. Prereq: PHYS 3710-20-30 and either PHYS 5310-20 or PHYS 6110-20. (Same as Electrical Engineering 5310-20-30. (Same as Electrical Engineering 6500-10.)

8610 Interaction of Radiation with Gases (2) Interaction of electromagnetic radiation with atomic and molecular systems; collection efficiency; action of charged particles with atoms and molecules; ionization; transillumination and light emission; photochemical reactions; electron swarm and electron beam experiments. Prereq or coreq: PHYS 6110-20-30.

8620 Interaction of Electrons with Solids (3) Collision with free electrons; stopping power; electron slowing down spectra; energy straggling; nuclear scattering; electron diffusion; plasmon emission; effects in irradiated solids; light emission from irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: PHYS 6110-20-30.

8630 Interaction of Radiation with Matter (3) Topics in nuclear physics; quantum mechanics; photon-electron interactions; electron-photon and molecule-molecule collisions, dielectric theory, stopping powers; scattering in electronic media; Cherenkov radiation, electron transport in gases and solids. Prereq or coreq: PHYS 6110-20-30.

6710-20-30 Advanced Solid State Physics (3, 3, 3) Lattice dynamics; phonons; Brillouin zones; heat capacity. Energy band structure of solids; cohesive energy; work function. Crystal oscillators; effective mass approximation; Debye, para and ferromagnetism; neutron diffraction. Fermi surface. Superconductivity. Phonon and electron scattering from phonons, electrons, and defects. Excitations; polarons; surface states. F-centers; dissociations; and other defects. Prereq: 4630, 5210-20. Prereq or coreq: 4630; 6110 for 6710, 6120 for 6720.

6810 Vibrational Problems in Molecular Spectra (3) Normal coordinates and potential functions; group theoretical methods and selection rules in gases and condensed phases. Laserspectroscopy and nonlinear electrophotical phenomena. Prereq: PHYS 5410 or equivalent. (Same as Chemistry 6810.)

6820 Molecular Vibration-Rotation Theory (3) Molecules as vibrating and rotating systems possessing rotational and vibrational properties; quantum mechanical theory of symmetric and asymmetric molecular vibrations including vibration-rotation interactions, normal modes, and energies of molecular transitions; methods of analysis used in high resolution molecular spectroscopy. (Same as Chemistry 6820.)

Political Science

MAJORS

Political Science

Public Administration

DEGREES

M.A. M.S. M.P.A.

Professors:
T. D. Unger (Head), Ph.D. Iowa; R. S. Avery, (Emeritus), Ph.D. North Carolina; D. H. Garlisie, Ph.D. North Carolina; L. S. Greane* (Emeritus), Ph.D. Wisconsin; V. R. Iredell, Ph.D. Chicago; D. D. Nimm, Ph.D. Vanderbilt; H. Piasa, Ph.D. Utah; N. M. Robinson, Ph.D. Syracuse; O. H. Stephens, Ph.D. Johns Hopkins; D. M. Welborn (on leave), Ph.D. Texas.

Associate Professors:
R. B. Cunningham, Ph.D. Indiana; J. Dodd, Ph.D. Tulane, A. Ettic, Ph.D. Columbia; G. Evans, Ph.D. Columbia; A. H. Hopkins, Ph.D. Syracuse; W. Lyons, Ph.D. Oklahoma; S. Osetky, Ph.D. Columbia; R. A. Peterson, Ph.D. Yale; G. J. Rathvon, Ph.D. Michigan State; T. McN. Simpson, Ph.D. Johns Hopkins; T. A. Smith, Ph.D. Ohio State.

Assistant Professors:
M. R. Fitzgerald, Ph.D. Oklahoma; P. K. Freeman, Ph.D. Wisconsin-Milwaukee; R. A. Gorman, Ph.D. New York; S. M. Neuse, Ph.D. Texas.

Registration in any courses in the 5000-5000 series may be repeated for credit with consent of the department.

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of promoting sound governmental administration through research, publication, and consultation. The staff is as follows: Professor Unger (director); Professors Lyons (associate director), Fitzgerald, Freeman (assistant professors); Research Associates Brown, Durant, Mauney, Thomas.

THE MASTER'S PROGRAM

See general requirements on page 19.

MASTER'S IN PUBLIC ADMINISTRATION

Specific requirements for graduation include:
1. The completion of 45 quarter hours of approved graduate courses including 9 hours of work in thesis. In lieu of thesis, candidates may complete a total of 48 quarter hours of course work.
2. At least 15 of the credit hours including thesis must be in approved courses numbered 5000 and above.
3. Demonstration of command of the material covered in course work in an oral comprehensive examination. A non-thesis student must have a written examination which may be followed by an oral.

Inquiries concerning all programs should be directed to the Department of Political Science, Knoxville, Tennessee 37916.

THE DOCTORAL PROGRAM

Specific requirements for the degree of Doctor of Philosophy in Political Science include:
1. A minimum of 117 quarter hours, following the Bachelor's degree, is required. At least 93 hours shall be in political science. At least 72 hours in political science shall be at the graduate level (i.e. earned in 5000- or 6000-level courses). At least 45 of these graduate level hours shall be at the 6000 level. This figure includes 36 hours of credit for the dissertation.
2. Each Ph.D. candidate must pass an examination in one foreign language. Students specializing in some areas may be required to demonstrate knowledge of a second language or appropriate research tools or both.
3. Admission to candidacy shall be based on written and oral preliminary examinations which must be passed not later than three quarters before the date on which the degree is granted.
4. The candidate must pass a final oral examination on the doctoral dissertation.
5. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.


3555 Minority Group Politics in the United States (4) Content varies from quarter to quarter. May be repeated with consent of department. Maximum 8 hrs.

3565 Introduction to Public Administrative Organization and Management (4) Organization and decision-making theory, line and staff services, politics of organization, leadership, personnel and fiscal management, administrative responsibility. Recommended prereq: 2510-20. (Same as Water Resource Development 3565.)


3605 Political Change in Developing Areas (4) Characteristics and problems of political changes with primary focus on developing areas.

3615-16 Dynamics of Black African Politics (4, 4)

3621-22 Politics of Asian States (4, 4)

3625-26 Latin American Government and Politics (4, 4)

3631-32 Government and Politics of the Soviet Union (4, 4)

3635-36 Politics in Western Democracies (4, 4) Political culture, patterns, and institutions of Western democratic systems.

3641 Government and Politics of Middle East and North Africa (4)

3710 State Politics (4) Focus on formal and informal setting of state government; governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy.

3720 State Government and Policy Making (4) Nature and functions of the institutions of state government; governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy.
3750 The Urban Policy (4) Analysis of political institutions and processes in metropolitan areas.
3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas.
3790 Contemporary Problems of Soviet Foreign Policy (4)
3601 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought.
3802 Studies in Medieval Political Thought (4) From Augustine to Luther; emphasis on problems and theories of religion and politics.
3803 Studies in Early Modern Political Thought (4) Machiaveli through the Enlightenment.
3804 Studies in Nineteenth- and Twentieth-century Political Theory (4) Political theories of industrial and technological societies; nineteenth and twentieth century.
3880 American Political Thought (4) Examination of role of selected political ideas, doctrines, and themes in America, emphasizing their development and relationships to diverse political interests.
4110 Law and the Administrative Process (4) Procedures, controls, and regulations over administrators.
4535-36 Political Attitudes, Opinions and Communication (4, 4) Nature, development, formation and distribution of attitudes; role of leadership, persuasion, and communication in opinion-policy process.
4540-50 Presidency, Congress and Public Policy (4, 4) The Presidency and Congress within framework of policy-making process.
4573 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.
4610 Budgetary Process (4) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications.
4620 Public Personnel Administration (3) Development of the merit system in government, career systems, public personnel management functions, organization for personnel management.
4665-66 Policy Making in Democracies (4, 4) Comparative approach to theory and process of making public policies.
4675 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.
4711 International Law (4)
4831-32-33 The Systematic Study of Politics (4, 4, 4) Scope, methods and procedures of analysis in political science; intended primarily for seniors intending to pursue graduate work and entering graduate students who have not had such a course.
4875 Special Topics in Political Thought (4) May be repeated with consent of department. Maximum 8 hrs.
4940 Politics and the Environment (4) Examination of formulation and implementation of public policies relating to physical environment with emphasis upon water and air pollution control.
4975 Seminar in Political Science (4) Selected research for seniors; primarily for majors. May be repeated with consent of department. Maximum 8 hrs.
5000 Thesis
5002 Non-Thesis Graduation Preparation (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated: 5/NC only.
5101 Foreign Study (1-12) See page 100.
5102 Off-campus Study (1-12) See page 100.
5103 Independent Study (1-12) See page 100.
5110-20 Seminar in Political Theory (3, 3) Selected political thinkers, schools, historical periods.
5140 Politics, Administration and Community in Metropolitan Areas (3) Analysis of problems and processes associated with community development.
5150 Internship in Political Science (3-9) Open to students participating in approved internship programs. May be repeated with consent of instructor. Maximum 9 hrs.
5210-20-30 Seminar in World Politics (3, 3, 3) Research in world problems and organization.
5211 Directed Readings in Political Science (3) May be repeated with consent of instructor and student's advisor. Maximum 9 hrs. May be taken for letter grade or S/NC.
5250 Seminar in African Politics (3) Selected topics in African politics.
5270 Seminar in the Politics of Development (3) Selected topics with political problems of less developed countries.
5310-20 Seminar in Comparative Government (3, 3) Selected topics in modern governments.
5340-50 Seminar in Latin American Government (3, 3)
5370-80 Seminar in Soviet Politics and Government (3, 3)
5410-20 Seminar in Public Law (3, 3) Special problems in constitutional and administrative law.
5440-50 Theory and Analysis of U.S. Foreign Policy (4) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process.
5510-20 Seminar in International Organization (3, 3) 5510—Introduction to regional international organizations; political integration at international level. 5550—Functional international organizations.
5540 Seminar in Comparative Public Administration (3) Approaches to and methods used in comparative analysis.
5550 Seminar in Administration in Developing Countries (3)
5600 Public Administration (3) Public administration theory and functions, approaches to public management, contemporary problems in public administration.
5605 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data.
5610-20 Seminar in Organization Theory (3, 3) Appraisal of major theories of organization and their applicability to public sector.
5611-21-31 Seminar in State-Local Administration (3, 3, 3)
5630 Seminar in Technology and Public Policy (3) Technological change and policy process, government interactions with scientific community, political characteristics of scientific enterprise.
5635-45 Operations Research for Public Administrators (3, 3) Operations research methodology; applications and limitations in public sector; linear programming, transportation and assignment problems, network analysis, PERT, dynamic programming and other methods.
5640-50-60 Seminar in Metropolitan Areas (3, 3, 3)
5641 Seminar in Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor.
5670-80 Seminar in Policy Analysis (3, 3) Role of administrators in policy analysis and decision making with special attention to historical and current issues.
5710 Seminar in the Politics of Administration (3) Examination of administration as a major actor in the American political system with emphasis upon public policy making and political roles of public administrators and agencies.
5740 Seminar in Organizational Analysis (3) Organizational theory applications in public management; field analysis of public organizations.
5750-55 Seminar in Public Management (3, 3) Selected problems.
5760 Seminar in TVA Public Personnel Management Practices (3) Exploration of public personnel management through in-depth examination of one of national government's foremost personnel systems—TVA. TVA staff and employee organization representatives serve as discussion leaders.
5765-75 Law and the Administrative Process (3, 3) Constitutional position; decisional processes, regulations and management; limitations on governmental action; questions of structure, role, and administrative choice.
5770 Practicum in Public Administration (3)
5780 Seminar in Fiscal Management (3) Fiscal role of government in mixed economy, sources of public revenue and credit, financial planning and control.
5785-85 Seminar in Staff Functions (3, 3) Functions of administrative staff personnel serving political executives, public bureaucracies, legislative bodies, and advisory and community groups in public sector. Selected topics include budgeting, personnel, evaluation, and other staff functions.
5810 The American Political Process (4) Principal patterns of political activity linking citizens and political institutions.
5820 The American Political Process (4) Selected problems. 5850 Seminar in Comparative State Politics (3) Intensive readings in comparative state politics focusing on environment of state politics, institutions and policy making.
5910-20-30 Methodology and Bibliography (3, 3, 3) 5910—Behavioral and mathematical approaches to research. 5930—Philosophical problems in research, traditional literature, and nonbehavioral projects.
6000 Doctoral Research and Dissertation
THE PSYCHOLOGICAL CLINIC

The Psychological Clinic supports graduate training in clinical psychology. Psychological diagnosis and psychotherapy are offered on an outpatient basis, with medical consultants, to the general public as well as to University students, on referral by a physician.

4107 Experience in Individualized Instruction (6) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4120 Topics in Social Psychology (4) Intensive analysis of selected research topics. Prereq: 3120 or Sociology 3130. (Same as Sociology 4120.)


4239 Laboratory in Sensory Processes and Perception (2) Prereq or coreq: 4230.

4460 Organizational-Industrial Psychology (3)

5150 Personality Theories (4) Prereq: 3550.

5160 Group Processes (3) Study and experience of theory and techniques of group process and facilitation. Those participating in 4610 are expected to continue into 4650 and 4660. Prereq: 3616-26 and consent of instructor.

4620 Seminar in Group Processes (3, 3) Didactic and laboratory experience for those qualified for further training as group facilitators. Prereq: 4610 and consent of instructor.

4640 Psychological Tests and Measures (4) Theory and construction of individual and group measures; survey of various methods of assessment of intelligence, personality, special abilities, and educational achievement. Prereq: 3550.

4650 Symbolic Processes (4) Logic of signs and symbols; directed and associative thinking; memory, problem solving, and concept formation; nature, use, and development of language. Prereq: 3210 or consent of instructor.

4660 The Psychology of Language (4) Theories and descriptions of phonology, syntax, and semiotics as applied to psychology and related disciplines. Recommended: 4650 or linguistics background.

4710 Physiological Psychology (4) Nervous system and physiological correlates of behavior. Prereq: 1 yr of biology or zoology and 2520.

4719 Physiological Psychology Laboratory (4) Laboratory studies of nervous system and physiological correlates of behavior. Coreq: 4710.

4720 Comparative Animal Behavior (4) Methods and principles. (Same as Zoology 4720.)

4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Zoology 4729.)

4750 Evolution and Ontogeny of Social Behavior (4) Genetic, evolutionary, ecological, and developmental processes as they apply to social organization and dynamics of vertebrates. Prereq: Consent of instructor.

4830 History and Systems of Psychology (4) Prereq: 8 hrs of upper division psychology.

4850 Learning Theories (4) Historical and theoretical development of learning models. Prereq: 3210.

4860 Programmed Learning (3) (Same as Curriculum and Instruction 4860.)

4870 Contemporary Research in Behavior of Women (4) Study of interaction of cultural and biological factors in determining the behavior of women, with emphasis on psychological mechanisms involved.

4880 Afro-American Psychology (4) Review and analysis of psychological literature on Afro-Americans. Prereq: Consent of instructor. (Same as Black Studies 4880.)

4900 Aspects of Urban Environment (4) Interdisciplinary course in urban problems. Prereq: Consent of instructor. (Same as Architecture 4900, Real Estate 4900.) S/NC only.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5017 Colloquium in Experimental Psychology (1) Coreq: 5018. S/NC only.

5019-29 Laboratory Techniques in Experimental Psychology (3, 3, 3) Required of all first-year students in experimental, physiological, and comparative psychology. Coreq: 5017. S/NC only.

5050 Methods of Research in Applied Psychology (3) Techniques and principles for designing and conducting psychological research in natural settings.

5070 Seminar in College Teaching (2) Concepts, methods, and materials in introduction of psychology at college level. Emphasis on research. Required of all Ph.D. candidates. S/NC only.

5079 Practicum in College Teaching (2) Supervised participation in college teaching. S/NC only.

5100 Developmental Psychology (3) Prereq: 3550 or Educational Psychology 2430. (Same as Educational Psychology 5100.)

5105 Developmental Assessment (3) Techniques for assessing development in infants and children. Does not include practicum. Prereq: 5100 or equivalent and consent of instructor.

5110 Clinical Aspects of Human Sexuality (3) Nature of sexuality: societal perspectives, personal identity, application, intimacy and isolation including psychosocial and psychosexual identity and models for decisions. Intended for graduate students in clinical psychology, social work, and community and mental health professions. Prereq: Consent of instructor.

5111-12-13 Seminar in Current Issues in School Psychology (1, 1, 1) Historical, legal, ethical and technological issues in practice of school psychology. Multiple instructors. (Same as Educational Psychology 5111-12-13.) S/NC only.

5140-50-60 Psychoeducational Assessment (3, 3, 3) Naturalistic, psychometric, and sociometric assessment methods in school learning environments. Must be taken in sequence. Prereq: Admission to School Psychology program or consent of instructor. (Same as Educational Psychology 5140-50-60.)

5149-59-69 Practicum in School Psychology I (2, 2, 2) First-year School Psychology Program practicum core sequence. Coreq: 5140-50-60. (Same as Educational Psychology 5149-59-69.) S/NC only.

5170-80-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 5170-80-90.)

5200 Topics in Developmental Psychology (3) Prereq: 5100 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs.

*5210 Readings in Psychology (1) S/NC only.

*5220 Readings in Psychology (2) S/NC only.
5400 Psychophysics and Scaling Methods (3) Prereq: One course in statistics.
5420-30-40 Advanced Psychological Statistics (3, 3, 3) Must be taken in sequence.
5450 Human Problems in Administration (3) (Same as Management 5230.)
5459-60 Seminar in Psychology (3, 3, 3)
5500 Fundamentals of Psychometrics (4) Basic ideas and principles of psychometrics. All graduate students who plan to take one or more courses in psychometrics required to take course.
5510 Instrumentation for Psychological Research (3)
5520 Theory of Mental Measurement (3) Reliability, validity, scaling and equating, norms, combining tests into batteries. Prereq: Descriptive statistics, 4640, and 5500.
5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 5050-70 or equivalent and consent of instructor.
5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, differential psychology, comparison of different populations in specific psychological parameters, individual choice behavior, and testing of psychological hypotheses in human and animal behavior; reliability theory and regression theory. Prereq: 1 qtr calculus or consent of instructor.
5590 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: 3120. May be used for credit in sociology. Only.
5560-70 Seminar in Social Psychology (3, 3) Prereq: 5550. May be used for credit in sociology. May be repeated. Maximum 9 hrs.
5580 Theories of Personality (3)
Radiation Biology
(Interdepartmental)

MAJOR

Radiation Biology

M.S., Ph.D.

Daniel Billen, Director

A graduate major in the field of Radiation Biology is offered through the Institute of Radiation Biology. This is a program covering both departmental and institutional lines. Included in the Institute staff are certain scientists from the Departments of Biochemistry, Botany, Chemistry, Microbiology, Physics, Zoology and the Memorial Research Center and the Comparative Animal Research Laboratory of The University of Tennessee, the Biology and Environmental Sciences Divisions of the Oak Ridge National Laboratory, and the Medical Division of Oak Ridge Associated Universities.

Formal courses in this program are offered mainly on the Knoxville campus. Thesis research may be carried on either at the University or at one of the Oak Ridge laboratories. Problems selected for thesis research shall involve the interaction of radiations or long-lived fission products and radiometric chemicals with biological systems, at the molecular, cellular, organismal, or ecological level of complexity. Areas of specialization currently include photobiology, environmental microbial, botanical, and biochemical and biophysical radiobiology.

ADMISSION REQUIREMENTS

The minimum academic requirements for admission to the Institute are: (1) a Bachelor's degree from an accredited college or university, (2) biological science, chemistry, physics: 30 quarter hours in one and 12 in each of the others, (3) college mathematics: potential candidates for the Master's degree, 9 quarter hours in one, (4) college mathematics: potential candidates for the doctoral degree, additional integral and calculus, (4) for the Ph.D. program, Graduate Record Examination scores.

THE MASTER'S PROGRAM

Course requirements include:
(1) Zoology 5610, (2) Zoology 5620 or 5770 or 5780, (3) Zoology 5350, (4) Chemistry 3810, (5) Biochemistry 4110-20 or 5610-20-30. At least one-half of the student's program must be at the 5000 level. A thesis is required of all students.

THE DOCTORAL PROGRAM

(1) Courses: In addition to those required for the Master's degree, Chemistry 4910-20-30; Physics 3710-20-30 (Chemistry 3810 may be substituted for Physics 3730); Radiation Biology 5620; 5780. Additional course requirements are determined by the student's faculty committee. The student's special field of interest and plans for a career determine these requirements. The more important courses from which selection may be made are advanced courses in biochemistry, botany, chemistry, electrical engineering, mathematics, microbiology, physics, and zoology. Courses are available in The University of Tennessee Graduate School of Biomedical Sciences at Oak Ridge. (2) The preliminary examination will consist of oral and written portions in radiation biology and in allied fields in which the candidate has received training. (3) The student's dissertation committee determines whether a foreign language is required for the doctoral degree. (4) The final examination will be an oral examination covering the candidate's dissertation and such other fields as the candidate's faculty committee may specify.

Regular attendance at the weekly Radiation Biology Seminar or an appropriate Departmental Seminar is expected of all students.

5000 Thesis

5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs.

5610-20 Foundations of Radiation Biology (4, 4) (Same as Zoology 5610-20.)

5780 Radiation Physics (4) (Same as Zoology 5780.)

6000 Doctoral Research and Dissertation

6910 Seminar in Radiation Biology (2) (Same as Zoology 6910.)

Religious Studies


Associate Professors: P. Daniel, Ph.D. Duke; W. L. Humphreys, Ph.D. Union; D. E. Lingle, Ph.D. Vanderbilt; C. H. Reynolds, Ph.D. Harvard.

Assistant Professors: P. R. Earl, Ph.D. Vanderbilt; J. Kim, Ph.D. Chicago.

Instructor: L. J. Fitzgerald, Ph.D. Chicago.

An M.A. in Philosophy with a concentration in religious studies is available for graduate work in these related fields. (Details of this program are available in the office of either department.) Graduate courses in religious studies further provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

3060-70-80 History of Western Religious Thought and Institutions (3, 3, 3) 3060—First Century to Fifth Century, 3070—Sixth Century to Eleventh Century, 3060—Sixteenth Century to 1900. (Same as History 3060-70-80.)

3210 Early Greek Mythology (3) (Same as Classics 3210.)

3220 Greek Mythology in the Classical Period (3) (Same as Classics 3220.)

3230 Roman Mythology (3) (Same as Classics 3230.)

3270 Russian Philosophical and Theological Thought (4) (Same as Philosophy 3270 and Russian 3270.)

3411-12-13 Renaissance and Reformation (3, 3, 3) (Same as History 3411-12-13.)

3440 Religion of Primitive Peoples (3) (Same as Anthropology 3440.)
Romance Languages

MAJORS

French
Spanish

DEGREES

MACT

M.A., Ph.D.

French

A. M.

Spanish

Ph.D.

THE DOCTORAL PROGRAM

Residence and Course Work: Completion of at least 9 consecutive quarters of full-time residence, a minimum of 81 credit hours in course work beyond the Bachelor's degree, and its equivalent, and a dissertation (36 credit hours).

No less than 54 quarter hours should be taken in courses pertaining to the student's major field; of these a minimum of 15 hours are to be taken in courses above 4000, and 12 hours may be taken in courses of the 4000 level and the rest in courses above 5000. All students must complete the series in methods of research (5151-61-71) for a total of 3 credits. The minor shall consist of at least 18 hours of which at least 12 hours must be numbered above 5000 and the rest above 4000, and should represent the student's area of concentration. In addition 9 hours of courses above 4000 in a related discipline are required. In special cases the latter requirement may be waived in favor of additional course work in the major field.

Language Requirements:

Students are expected to demonstrate written and oral fluency in Spanish as well as knowledge of two other foreign languages. One of these must be French; the second one should be chosen from such languages as German, Italian, Portuguese, Arabic or Hebrew in accordance with the student's field of concentration. Proficiency in Latin shall be required of all students specializing in an area related to philology or the medieval period.

Examinations:

A preliminary comprehensive examination, both written and oral, covering the major and minor fields must be passed before the student can become an official candidate for the degree. This preliminary examination is to be held at the time deemed most appropriate by the student's major advisor and committee. The candidate is expected to defend the dissertation in a final oral examination.

For additional information on the program, consult pages 21-22.

Arabic

3610 Intermediate Modern Standard (4, 4)

3610 Islamic Literature in English Translation (4)

Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian, and Turkish. Reading include The Arabian Nights, The Rubaiyat of Omar Khayyam and Gibran's The Prophet.

5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) (Same as Spanish 5070-80-90)

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

French

3010-23-30 Elements of French for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations in upper division.

5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) (Same as Spanish 5070-80-90)

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.
4010 Masterpieces of French Literature in English Translation (3) No foreign language credit.

4020 Masterpieces of French Drama in English Translation (3) No foreign language credit.


4150 Theatrical French (1-3) Performance in one or more French plays. Prereq: Intermediate French or equivalent and consent of instructor. May be repeated with consent of department.

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. 

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent.

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent.

4250 Introduction to Descriptive Linguistics (3) Phonetics and phonology, morphology and syntax. Types of languages, linguistic groups, dialects and dialect geography. Application of descriptive linguistics—field linguists, dialect study, its practical use in learning languages and in language teaching. Introduction to transformational grammar. Prereq: 9 hrs of upper division English or 9 hrs of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30) or permission in literature translation, and general courses in Latin and Greek requiring no knowledge of these languages, or consent of department. (Same as German, Spanish and Russian 4250.)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, Russian, and Spanish 4260.)

4270 Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into the major Romance languages. (Same as Spanish 4270.)


4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent.

4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent.


4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated S/NC only.

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. Intensive course in explication de texte.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

5110-20-30 Old French (3, 3, 3) Medieval French language and literature.

5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department.

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as Italian and Spanish 5151-61-71) S/NC only.

5210-20-30 French Literature of the Sixteenth Century (3, 3, 3)

5230-60-70 The Philosophers (3, 3, 3) Textual analysis of the works of Voltaire, Diderot, Rousseau, and other eighteenth-century writers.

5410-20-30 The French Novel (3, 3, 3)

5450-60 Lyric Poetry of the Nineteenth Century (3, 3) 5450—German and English influences on French Romanticism and generation of the poets of "le mal du siecle." 5460—Victor Hugo; the Pernanns.

5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and Petits poemes en prose with emphasis on the theories of color and "correspondances" and their influence on Symbolist school.

5610-20-30 Trends in Contemporary French Literature (3, 3, 3)

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories.

5670 Problems in Romance Linguistics (3) Topics vary. May be repeated with consent of department. Prereq: 4270 or equivalent. (Same as Spanish 5670.)

5710-20-30 Seminar in French Literature (3, 3, 3) Topics vary. May be repeated with consent of department.

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as Spanish 5910.)

Italian

3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian or equivalent.

3310-30-30 Italian Literature in English Translation (3, 3, 3) Italian School, the Flor- entine School, Dante, Petrarcho, Boccaccio, Machiavelli, Ariosto, Tasso. 3320—From the Baroque through nineteenth century, commedia dell'arte, Vico, Leopardi. 3330—Twentieth century, Carducci, Pirandello, Quasimodo, D'Annunzio, Ciora, Moravia. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs.

3510-20 Aspects of Italian Literature (4, 4) Prereq: Intermediate Italian or equivalent. Recommended for literature majors.

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. Intensive course in explication de texte.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

Spanish

4030 Masterpieces of Spanish Literature in English Translation (3) No foreign language credit.

4050-60-70 Hispanic-American Literature and Culture (3, 3, 3)

4110-20 Spanish Literature of the Golden Age (3, 3, 3) The picarosque novel; Cervantes; the Comedia.

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level.

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent.

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent.

4250 Introduction to Descriptive Linguistics (3) (Same as German, French, and Russian 4250.)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, Russian, and Spanish 4260.)

4270 Romance Linguistics (3) (Same as French 4270.)

4410 Spanish Civilization (3) Prereq: Intermediate Spanish or equivalent.

4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent.
4500-70 Studies in Modern Spanish Style (3, 3) Prerequisite 4510-20 of instructor.

4510-20 Spanish Literature of Nineteenth Century (3, 3, 3) Prerequisite Intermediate Spanish or equivalent.

4710-20 Spanish Literature of the Twentieth Century (3, 3, 3) 4710—Non-dramatic prose fiction, poetic and native Spanish choral lyric; development of classical muwashshah, the colloquial zajal, and the later villancico. Readings in Arabic and Spanish. (Same as Arabic 5070-80-90.)

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. An intensive course in explication de texte.

5070-80-90 Hispano-Arabic Language and Literature (3, 3, 3) 5070—General culture history, philosophy in Arab Spain. 5080—Development of traditional Arabic poetry and popular narrative, into modern novel of character after invention of printing. 5090—Mutual influence of traditional Arabic poetry and popular narrative, into modern novel of character after invention of printing. 5090— designed to acquaint students with the development of the Arabic language and literature, with particular emphasis on the development of the novel in Arabic and its influence on modern Arab literature. 5090—Special topics in the history of Arabic literature, with particular emphasis on the development of the novel in Arabic and its influence on modern Arab literature. 5090—Topics vary. May be repeated with consent of department.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5110-20-30 Old Spanish (3, 3, 3) Medieval Spanish language.

5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department.

5151-1-17 Bibliography and Methods of Research (1, 1, 1) (Same as French and Italian 5151-1-17) S/NC only.

5211-21 Don Quijote (3, 3) Must be taken in sequence.

5212-23-24 Golden Age Prose (3, 3, 3) 5212—La Celestina; critical study of Fernando de Rojas' life and work. Celestinesque genre; Feliciano de Villanocó's stages. Readings in Arabic and Spanish. 5213—Guzman de Alfaro and Spanish picar- genre.

5251 The Exemplary Novels, Peralles y Sigismunda (3)

5250-60 The Generation of '98 (3, 3) Angel Ganivet, Giner de los Rios, Baraja, Unamuno, Valle Inclan, Beravente, Azorin, Perez de Ayala.

5270 The Contemporary Novel (3) Civil War and post-Civil War period.

5310-20 Directed Readings (3, 3)

5311-21 Special Topics in Spanish or Spanish American Literature (3) May be repeated.

5340 Problems in Hispanic Culture (3) Prevailing social, political, artistic, literary and ideological conditions and patterns of any area or period within Spanish or Latin American culture. May be repeated with consent of department. Maximum 6 hrs.

5510-20-30 The Spanish Theatre after the Golden Age (3, 3, 3) 5510—From eighteenth century through Romanticism. 5520—From Realism through Generation of 1898. 5530—Contemporary theatre.

5550-60-70 The Golden Age Theatre (3, 3, 3) 5550—Introduction to Spanish theatre, Lope and Tirso. 5560-20 Calvino, Miguel de Armesca and Alarcon. 5570—Alarcon, Zorrilla, Moreto, and Calderon.

5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay.

5611-21 Spanish American Lyric Poetry (3, 3)

5620-30 The Modern Novel in Spanish America (3, 3)

5631 Spanish American Essay (3)

5632 The Spanish American Short Story (3) Short story as major literary genre in Spanish America. Reading and criticism of works of authors such as Dario, Quiroga, Borges, Arreola, and Rufio.

5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos, Solon, Rodolfo Uslidi, Conrado Nale Roxlo, Roberto Cossa, Rene Marques and Sebastian Salazar Bondy. Presentation of films as adaptations of classical or modern plays such as Dona Barbara, Los de abajo and Don Segundo Sombra as well as ex-ponents of experimental cinema of today.

5640 Latin American Women Women Writers (3) Femi-nine point of view, modern image of woman, male-female relationships and society as context for woman's destiny. Readings from poetry and fiction, including such authors as Allfonso, Delmira Agustini, Gabriela Mistral, Silvina Buhirl, Silvina Ocampo, and Rosario Castelanos.

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literar- sty lines in compositions, sketches, and original stories.

5670 Problems in Romance Linguistics (3) (Same as French 5670.)

5810-20-30 Spanish Lyric Poetry (3, 3, 3)

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as French 5910.)

6000 Doctoral Research and Dissertation

6210-20-30 Seminar in Spanish Literature (3, 3, 3)

6310-20-30 Seminar in Latin American Literature (3, 3, 3) Topics vary in field of Peninsular Literature. May be repeated with consent of department.

6310-30-30 Seminar in Latin American Literature (3, 3, 3) Topics vary. May be repeated with con- sent of department.

For a full statement of departmental requirements, students are referred to the Departmental Manual. All registration for 3000- and 4000-level courses require the consent of the instructor. THE MASTER'S PROGRAM

The department offers both a thesis and non-thesis option for a Master's degree. For information on the Master's degree with thesis, see the General Requirements on page 19. Those interested in the non-thesis option should obtain details from the department.

THE DOCTORAL PROGRAM

General requirements for the degree of Doctor of Philosophy are described on page 21. Additional specific requirements for the degree of Doctor of Philosophy in Sociology include:

1. A minimum of 108 credit hours following the Bachelor's degree, exclusive of credits for the Master's thesis, is required. Of this number, 36 hours shall be allocated to doctoral research and dissertation. A maximum of 12 hours credit outside the major may be taken in related fields, with the approval of the student's committee. Exclusive of doctoral research and dissertation at least one-half of all credits shall be in courses numbered 5000 or 6000.

2. A written preliminary examination covering sociological theory, research methodology, and two other areas in sociology must be passed prior to admission to candidacy. This examination must be passed not later than one academic year before the date on which the degree is granted.

3. No later than one month before granting of the degree, the candidate will be required to pass an oral examination on the doctoral dissertation. At the oral examination the candidate will be expected to show a thorough knowledge of sociological theory and methodology related to the research.

4030 Society and Law (4) General treatment of social origins and consequences of law and legal process. Particular emphasis is placed on prob- lems of law and social change, and on structure and functioning of legal sanctions. Some attention is paid to law and law-like phenomena in for- mal organizations and primitive societies.

4110 Population Problems (4) Demographic fac- tors and social structure; trends in fertility, mor- tality, population growth, migration, distribution, and composition; population policy.

4120 Topics in Social Psychology (4) (Same as Psychology 4120.)

4130 Sociology of Punishment and Corrections (4) Traces development of correctional move- ment, develops a critical sociological perspective on contemporary correctional programs, and provides overview of evaluative research in correc- tion.

4310 Criminology (4)

4330 Urban Ecology (4) Examination of public, private, collective, and individual actions. Classi- cal school of ecology, its neoclassical revisers, social area analysis, and cognitive symbolic ecol- ogy, oversimplified.

4410 Educational Sociology (3) (Same as Curricu- lum and Instruction 4410.)

4530 Community Organization (4) Structure; function; linkages; change and development and
important community studies are reviewed and discussed. Emphasis on sociological analysis; not on the implementation of change.

4540 Social and Religious Change (4) Critical review of historical and contemporary theories and methods employed in study of social change. Attention given to both macro and micro group change. (Same as Religious Studies 4540.)

4560 Formal Organization (4) Analysis of bureaucratization process, division of labor, delegation of authority, and relationship between organizations. Emphasis on sociological models and substantive theories of mental illness. Historical development of theoretical conceptualizations. Systems approach to the study of social interactions. Prerequisites: 1560 or 1561.

4820 American Minority Groups (4) Minority groups and social structure in American society; analysis of intergroup relations with attention given to both past and present relationships of selected groups to broader society.

4930 Social Movements (4) Development, organization, and function of social movements; attention given to the ideology, leadership and organization of political, religious and other types of social movements.

4940 Sociology of Religion (4) Interrelationship of society, culture, and religion. (Same as Religious Studies 4940.)

4960 Tradition, Change and Modernity in Asia (4) (Same as Religious Studies 4960.)

5000 Thesis

5050 Seminar in Political Sociology (4) Political system from societal, organizational, and group perspectives.

5060-70 Special Social Investigation (3, 3) Directed readings and/or research projects.

5200 Seminar in Collective Behavior and Social Movements (3)

5210, 5420-30 Social Theory (3, 3, 3)

5220 Social Control (3)

5230 Seminar in Sociology of Medicine (3)

5240 Theory and Research in Human Migration (3)

5250 Selected Topics in Migration Research (3)

5310 Seminar in Methods of Sociological Research (3) Major methodological issues in sociology; scaling techniques; reliability, validity, sampling, and qualitative methodology.

5320-30 Special Statistics (3, 3) General survey of parametric and nonparametric procedures in analysis of sociological data; assumptions underlying procedures; advantages, disadvantages, and special applications. Must be taken in sequence.

5520 Crime, Law, and Social Control (3)

5530 Seminar in Community (3)

5550 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in contemporary life.

5560-70 Field Research in Deviance (3, 3)

5580 Sociology of Mental Disorders (3) Relationship between formal sociological models and substantive theories of mental illness. Historical development of theoretical conceptualizations. Interdependence of theory and therapeutic techniques. Epidemiology of mental disorders. Review of major studies.

5590 Social Differentiation and Stratification (3) Various sources of differentiation in society, their relation to conflict in society, and their relationship to class structure in society.

5610 Seminar in Occupations (3) Occupations and their relation to individual and society; technology and occupations; unequal rewards and occupations; social organization and occupations.

5620 Seminar in Occupations (3) Continuation from material in Sociology 5610; interface between occupations and settings in which they are performed.

5630 Seminar in Occupations (3) Research participation; directed projects on subjects developed in 5620. Prereq: 5610 or 5620.

5640 Social Structure and Personality (3) Social interaction and personality; genesis and functioning of self; cultural basis of personality. May be used for credit in psychology.

5670 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5720 Small Group Theory and Research (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research design to test selected theoretical problems. May be repeated.

5730 Seminar in Research Problems in Intergroup Relations (3) Research techniques and approaches in study of intergroup relations. Prerequisites: 5610 or 5620.

5810 Seminar in Race and Culture (3) Critical examination of theoretical and conceptual approaches in study of intergroup relations.

5910 Urban and Regional Sociology (3)

5920 Seminar in Social Attitudes (3)

5940 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delinquency, research findings related to them, and their implications for formal strategies of control and rehabilitation.

5950 Seminar in Population Theory (3) Mathematical, optimum population, and selected variables are examined. Prereq: 4110.

5960 Demographic Techniques (3) Life, table, standard rates, and survey techniques of population analysis.

5970 The Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Relations between urbanization, industrialization, and modernization.

6000 Doctoral Research and Dissertation

6040 Experimental Research (3)

6050 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychology 6050.)

6070 Field Research (3)


6090-100 Survey Design and Analysis (3, 3) Application of general methodological principles to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtrs).

6130 Seminar in Mass Behavior and Related Topics (3)

6140 Advanced Reading in Sociological Theory (4)

6150 Advanced Reading in Sociological Methods (4)

6160 Advanced Special Social Investigation (4)

6170 Cross-cultural Aspects of Human Fertility (3) Historical, topical, regional, and methodological approaches to human fertility and demographic problems. Consideration of relations obtained between socioeconomic and demographic change in various parts of world; fertility rates and national power; controversies on control of vital rates of growth.

6180 Theory and Method of Human Ecology (3) Theoretical perspective and research techniques of human ecology applied to selected research sites.

6190 Advanced Special Social Investigation (4)

6510 Advanced Issues in Criminological Theory (3) Emphasis on problems related to theory construction and measurement.

6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding cause and procedures and programs for social control. Prereq: 4760 and 5520.

6530 Sociology of Law (3) Analysis of social and cultural factors influencing emergence and maintenance of law as social institution and affecting relations between law and deviant behavior; appraisal of theoretical and methodological issues encountered in studying law.

6540 Readings in Criminology and Deviance (3) Directed readings and selected topics on criminology and deviance.

6550 Advanced Studies in Community (3) Analysis of concepts of community, theories of community change, and techniques used in community research.

6610 Seminar in Formal Organization (3) Major formal organizational theories; bureaucracy; functions of theoretical models of organizations; major organizational variables; organizational authority patterns; communication in formal organizations. Prereq: 3610-20.

6710 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in research and current position of theory.

6910 Advanced Studies in Social Psychology (3) Social interaction and personality; genesis and functioning of self; interplay of social structures and individual actions; theories of social psychology related to these problems and recent research are discussed. May be repeated. Prereq: 3130 or 5640 or Psychology 5950.

6940-50 Social Change (3, 3) Major theories, methods, and research.

6940 Advanced Studies in Urban Sociology (3) Field work projects; community studies examined and/or applied in specified areas. Prereq: 3410-20.

Spanish
See Romance Languages

Speech and Hearing Sciences
See Audiology and Speech Pathology

Speech and Theatre

MAJOR Degree

Speech and Theatre

Professors:

Associate Professors:
S. C. Cook, M. A. Alabama; R. C. Fied, M. A. Miami (Ohio); R. W. Glenn, Ph. D., Northwestern; A. M. Harris, Ed. D., University of Southern California; L. W. Lester, Ed. D., Tennessee; R. R. Marshawn, M. A. Tennessee.
The departmental requirement for the M.A. degree in Speech and Theatre is 45 quarter hours (inclusive of hours taken toward a minor), at least 23 hours of which must be earned in courses numbered 5000 or above. Speech and Theatre 5110 is required of all M.A. students. Concentrations include speech communication, general speech, and theatre. For detailed information about program concentrations, contact the Director of Graduate Studies, Department of Speech and Theatre.

MASTER OF ARTS DEGREE CURRICULUM

The departmental requirement for the M.A. degree in Speech and Theatre is 45 quarter hours (inclusive of hours taken toward a minor), at least 23 hours of which must be earned in courses numbered 5000 or above. Only 9 hours of thesis credit (Speech and Theatre 5000) may be included in the 45-hour minimum for the degree. Speech and Theatre 5110 is required of all M.A. students. Area concentration requirements are as follows: Speech Communication

(1) Enrollmment in Speech 4999 during each quarter of full-time graduate study.
(2) 12 hours in rhetorical and communication theory.
(3) 9 hours in public and interpersonal communication.
(4) 3 hours (not inclusive of Speech and Theatre 5110 and Speech 4999) in methods and materials in speech communication.

Theatre

(1) 15 hours in theatrical history and criticism.
(2) At least 9 hours in performance and production (and no more than 12 hours in performance and production courses may be included in the 45-hour minimum for the degree).
(3) No more than 6 hours in projects courses.

Speech

3541 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211
4222 Advanced Argumentation and Debate (4) Prereq: 2331 or consent of instructor.
4461 Quantitative Research Methods in Speech Communication (4) Designing experiments; planning field studies; using statistical analysis.
4551 Southern Oratory (4) Historical and critical study of public address in the South.
4560 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public addresses in campaign for women's rights from the 1830s to present.
4571 British Oratory (4) Historical and critical study of British public address.
4582 Public Discussion of Race (4) History and criticism of racial advocacy in America.
4591 Persuasive Uses of Imaginative Literature (4) Topics in social and political uses of novels, plays, and poems.
4811 Advanced Phonetics (4) Phonetic aspects of contemporary dialects of the English language. Prereq: Consent of instructor.
4911-21 History of American Public Address (4, 4) 4911—Colonial period to 1865. 4921—1866 to present.
4999 Colloquium in Speech Communication (1) May be repeated.
5140 Communications Theory (3) Analysis of contemporary theories of human communication, emphasizing similarities and differences of communication processes in intrapersonal, interpersonal, and mass communication systems. (Same as Communications 5140.)
5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs.
5220 Quantitative Projects in Speech Communication (3) May be repeated. Maximum 9 hrs.
5430 Studies in Tennessee Oratory (3) May be repeated. Maximum 9 hrs.
5440 Organizational Communication (3) May be repeated. Maximum 9 hrs.
5550-60-70 Studies in Persuasion (3, 3, 3)
5750-60-70 Studies in Rhetoric (3, 3, 3)
5911 Directing the Forensic Program (4) Philosophical and method of directing cocurricular and extracurricular forensic activities in high school and college; handling of competitive and noncompetitive approaches to directing debate, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911.)

Speech and Theatre

4170-80-90 Film History and Theory (3, 3, 3) Analysis of cinematic forms and styles. 4170—Narration. 4180—Exposition and persuasion. 4190—Experimental forms; films and other media.
4640 Group Performance of Literature (4) Oral interpretive techniques of choral reading, readers theatre and chamber theatre.
5000 Thesis
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
5110 Introduction to Graduate Research in Speech and Theatre (3)
5120 Directed Reading and Research (3) May be repeated. Maximum 9 hrs.
5160 Theory and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. May be repeated. Maximum 9 hrs.

Theatre

3121-22 Advanced Acting (4, 4) Historical styles of acting. 3121—Renaissance. 3122—seventeenth and eighteenth centuries. Prereq: Consent of instructor.
3151 Theatre Practicum: Performance (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor.
3152 Theatre Practicum: Production (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor.
3153 Outdoor Repertory Productions (4) Supervised work on productions at Hunter Hills Theatre.
Ohio State; J. R. Kennedy, J. C. Howell Ph.D. Minnesota; Ohio; J. C. Ph.D. Illinois; Zoology

MAJOR graduate credit by Ecology majors.

with consent of instructor. May not be taken for change from quarter to quarter. May be repeated. Maximum 9 hrs.

and reproducibility of zoology may be fulfilled before the student can take the preliminary examination.

The student's faculty committee may require of the student any level of training or proficiency in a second foreign language but may not require that the student take the official foreign language examination in the second language.

3.0 out of a possible 4.0. and Advanced Biology); and (7) a grade Examination scores (Verbal, Quantitative and Advanced Biology); and (7) a grade point average of 3.0 out of a possible 4.0.

Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the Graduate Affairs Committee.

A course in biostatistics is required of all candidates for an advanced degree in Zoology.

All aspirants for advanced degrees in Zoology must exhibit competency in four (M.S.) or five (Ph.D.) of six areas of zoology as determined by a comprehensive examination. Students must take this examination during the fall quarter of the first year and may repeat the examination the following fall quarter if unsatisfactory scores are received. Competency must be exhibited within this two-year period for a student to continue in the program.

Preparation for thesis or dissertation: During the first year a written examination and a special research problem in each of two faculty major's laboratories will determine the student's preparation for thesis or dissertation study.

THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee, (2) the preliminary examination will be oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a B in 3030 language courses. This requirement for the first language must be fulfilled before the student can take the preliminary examination.

The student's faculty committee may require that all applicants for advanced degrees in Zoology must exhibit competency in four areas of study. These areas include (1) basic principles of cell biology, genetics, and ecosystem; (2) chemistry, two years including 12 quarter or 8 semester hours of general inorganic; (3) mathematics, 9 quarter or 6 semester hours including differential and integral calculus; (4) physics, 12 quarter or 8 semester hours; (5) Graduate Record Examination scores (Verbal, Quantitative and Advanced Biology); and (7) a grade point average of 3.0 out of a possible 4.0.

Subjective superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the Graduate Affairs Committee. A course in biostatistics is required of all candidates for an advanced degree in Zoology. All aspirants for advanced degrees in Zoology must exhibit competency in four (M.S.) or five (Ph.D.) of six areas of zoology as determined by a comprehensive examination. Students must take this examination during the fall quarter of the first year and may repeat the examination the following fall quarter if unsatisfactory scores are received. Competency must be exhibited within this two-year period for a student to continue in the program.

Preparation for thesis or dissertation: During the first year a written examination and a special research problem in each of two faculty major's laboratories will determine the student's preparation for thesis or dissertation study. THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee, (2) the preliminary examination will be oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a B in 3030 language courses. This requirement for the first language must be fulfilled before the student can take the preliminary examination.

The student's faculty committee may require that all applicants for advanced degrees in Zoology must exhibit competency in four areas of study. These areas include (1) basic principles of cell biology, genetics, and ecosystem; (2) chemistry, two years including 12 quarter or 8 semester hours of general inorganic; (3) mathematics, 9 quarter or 6 semester hours including differential and integral calculus; (4) physics, 12 quarter or 8 semester hours; (5) Graduate Record Examination scores (Verbal, Quantitative and Advanced Biology); and (7) a grade point average of 3.0 out of a possible 4.0.
6210 Seminar in Physiology (2) Prereq: Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) Prereq: 4310. May be repeated. Maximum 6 hrs.


6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

6510 Seminar in Genetics (2) Prereq: General genetics. May be repeated. Maximum 6 hrs.

6610 Seminar in Ornithology (2) Prereq: 4300. May be repeated. Maximum 6 hrs.

6650 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, 4660-70, Botany 5061, or consent of instructor. May be repeated. Maximum 6 hrs.

6710 Seminar in Ecology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6910 Seminar In Radiation Biology (2) Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
The College of Nursing offers a five-quarter program of study leading to the Master of Science in Nursing degree. The general purpose of the program is to prepare at the graduate level nurses who are qualified to function as practitioners, clinicians, educators, and administrators in all segments of the health care delivery system.

Upon successful completion of the program, graduates will be able to:
1. Provide advanced high quality, comprehensive nursing care to individuals and groups in a variety of settings;
2. Collaborate with other health professionals in systematic implementation and evaluation of health care delivery to large groups in agency and community settings;
3. Utilize appropriate advanced teaching, administrative and clinical practice skills in the discharge of one's professional responsibilities;
4. Utilize appropriate research findings in the implementation and evaluation of nursing care;
5. Participate in clinical research activities by means of data collection, tabulation, and analysis, and by generating research topics for referral to nurse researchers.

GENERAL REQUIREMENTS
1. Meet requirements for admission to the Graduate School.
2. Hold a Bachelor's degree in Nursing. If the Bachelor's degree is not in Nursing the applicant must demonstrate successful completion of the equivalent of an upper division major in Nursing.
3. If the number of qualified applicants exceeds the number that can be accommodated, preference will be given to applicants:
   a. whose undergraduate GPA is 3.0 or higher;
   b. who have had at least two years of full-time clinical practice experience following completion of a baccalaureate nursing program;
   c. who are Tennessee residents;
   d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program; or
   e. who are currently employed as nurse educators in programs preparing registered nurses; or
   f. who are currently employed as directors of nursing service.
4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.

DEGREE REQUIREMENTS
1. Students must complete 60 quarter hours of graduate level course work with a cumulative GPA of 3.0 or better.
2. The 60 credit hours must include the following components:
   - Core requirement: 14 hrs
   - Clinical concentration option: 26-30 hrs
   - Functional concentration option: 11 hrs
   - Electives: 5-9 hrs
   - Total: 60 hrs
3. A Master's thesis is not required, but those students who wish to complete a thesis as a part of their program may substitute the thesis for the 9 elective hours.
4. Those students who do not choose the thesis option must successfully complete a comprehensive final examination.
5. Students may choose either primary or secondary care as a clinical concentration option. Students selecting the primary care nursing option must complete the following courses: 4770, 5050, 5240, 5260, 5650. Students selecting the secondary care nursing clinical option must complete the following courses: 5120-30 (or 5140-50), 5160, 5310, 5330.
6. The core requirement which must be completed by all students regardless of clinical option includes 5010, 5020, 5210, and a graduate level statistics course which must be approved in advance by the student's faculty advisor.
7. Students may select a functional concentration option in teaching, management or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5630. Students selecting the management option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the advanced clinical practice option must complete 5560 and 5660 if their clinical option is primary care or 5320 and 5340 if their clinical option is secondary care. All courses taken in other colleges must be approved in advance by the student's faculty advisor.

Faculty
Professor:
S. E. Hart (Dean), Ph.D. New York.
Associate Professors:
M. E. Groer, Ph.D. Illinois; J. Kant, Ph.D. Illinois; J. Millian, Ph.D. Purdue; B. M. Reid, M.S.N. Columbia.
Assistant Professors:
K. P. Conlon, M.S.N. SUNY (Buffalo); M. M. Fenske, M.S.N. SUNY (Buffalo); K. J. Kant, Ph.D. Purdue; M. F. Kollar, M.N. Florida; C. Knapper, M.N. Vanderbilt; M. F. Kollar, M.N. Vanderbilt.

Courses
4350 Oncology Nursing (3) In-depth exploration of the cancer problem, medical and nursing intervention. Relates cellular kinetics to theories of carcinogenesis and metastasis, and examines treatment modalities and nursing intervention employed in all phases of the disease. Interdisciplinary approach analysed. Prereq: Nursing 4230, R.N. status, or consent of Instructor.
Indications for treatment and referral; use of behavioral or biomedical statistics. Use of the literature; presentation and publication of research process to identify and solve common body systems. Prereq: 5010.

5210 Nursing Research Methods (4) Utilization of physiology and pathophysiology related to various age groups over life continuum; nursing and health care management of individuals and groups who must deal with one or more chronic health problems throughout most or all of their lives. Prereq: 5010, 4770. 2 hrs and 2 labs.

5260 Advanced Family Health Care (4) Nursing and health care management of families in childbearing and child-rearing stages of development; advanced developmental theory, family dynamics, management of women during pregnancy, labor and delivery, and post partum period, assessment of newborn infants. Prereq: 5010, 4770. 2 hrs and 2 labs.

5310 Secondary Care Nursing Field Work I (9) Advanced clinical practice in acute care hospital settings with opportunities to apply newly acquired nursing knowledge to complex clinical nursing situations. Prereq: 5120-30 or 5140-50.

5320 Secondary Care Nursing Field Work II (9) Continuation of 5310 with emphasis on further acquisition and refinement of nursing skills needed to provide high quality nursing care to acutely ill patients. Prereq: 5310.

5330 Secondary Care Nursing Seminar I (2) Weekly on-campus seminar taken concurrently with 5310; topics focus on discussion of nursing problems commonly encountered in acute care settings.

5340 Secondary Care Nursing Seminar II (2) Continuation of 5330 to be taken concurrently with 5320.

5410 Principles of Community Mental Health I (3) Epidemiology of mental health; sociocultural, religious, and economic variables affecting mental health status of individuals, families, and communities; function and status of community mental health centers.

5420 Principles of Community Mental Health II (3) Continuation of 5410 with emphasis on recognized and developing approaches to mental health promotion and maintenance.

5430 The Adult and Mental Health (3) Coping and adjustment problems commonly experienced from post adolescence through middle adulthood; nursing approaches to alleviation of mental health problems of both institutionalized and noninstitutionalized adults.

5550 Nurse Practitioner Fieldwork I (9) Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5050, 5240, 5260.

5560 Nurse Practitioner Fieldwork II (9) Continuation of 5550 with further emphasis on acquisition of nurse practitioner skills coupled with ability to function more autonomously. Prereq: 5550.

5630 Teaching Strategies and Practicum (5) Analysis and application of curricular and teaching modalities; field placement with supervised opportunities to provide both classroom and clinical instruction to undergraduate nursing students. Prereq: 6 hrs approved education courses or consent of instructor. 2 hrs and 3 labs.

5650 Nurse Practitioner Seminar I (2) Weekly off-campus seminar taken concurrently with 5550; topics focus on common nursing and health problems identified by nurse practitioner field students and on role of nurse practitioner in health care delivery.

5660 Nurse Practitioner Seminar II (2) Continuation of 5650 taken concurrently with 5560.

5730 Management Strategies and Practicum (5) Analysis and application of managerial and supervisory theories and strategies; field placement in nursing service facility with supervised practice in nursing service administration. Pre-
The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, located within the Biology Division of Oak Ridge National Laboratory, offers programs leading to the Master of Science and Doctor of Philosophy degrees. The National Laboratory, one of three installations operated at Oak Ridge by Union Carbide Corporation for the Department of Energy, is a well-known center of basic research. The School utilizes the staff and facilities of this laboratory, and thus brings directly into the mainstream of full-time graduate study in the life sciences the talent and experience of that staff, as well as the most advanced research methods and technology.

The program of study, which incorporates a high faculty-to-student ratio, is based on intensive graduate courses supplemented by tutorial instruction, participation in a wide variety of seminars, and a heavy emphasis on communication skills, research training and independent study. The program encourages students to pursue graduate studies to the limits of their abilities.

The School is not departmentalized, and, apart from certain basic requirements, each student’s curriculum is planned to meet individual needs, with the aim of giving: (1) strength in the basic sciences; (2) perception of the biomedical sciences as a whole; and (3) experience and training in a chosen specialty.

The research areas available for Master’s thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, and cellular, developmental and mammalian biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, and problems of aging.

ADMISSION REQUIREMENTS
A Bachelor’s degree or its equivalent is required. Students with M.D., D.V.M., or M.D. degrees are also encouraged to apply. Completed applications, Graduate Record Examination scores and letters of reference should be sent to the address below. The student will need previous training in biology, calculus, physics, and organic and physical chemistry. However, a course in physical chemistry is offered by the School in order to meet this requirement. It is recommended that deficiencies in meeting entrance requirements should be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to: Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM
Requirements for the Ph.D. degree are:
1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology (5180-90); Mammalian Physiology (5200); and Statistics for Biologists (5740).
2. Three quarters of Biomedical Sciences Laboratory (5310-20-30-40).
3. Participation in Biomedical Sciences Seminar (5350-60-70) for one year.
4. Participation in at least one of the seminar courses (6110-70) during each quarter of residence after the first year is strongly recommended.
5. Satisfactory completion of formal advanced courses in the areas of the student's interests. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.
6. Pass both written and oral examinations.
7. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course work 6000 is required.
8. A final oral examination on the dissertation.
9. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM
The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and as space is available.

Requirements for the M.S. degree are:
1. Graduate credit or a proficiency in the following core courses: Biochemistry (5110-20); Cell Biology I (5180); Cell Biology II (5190); plus any three of the following four courses: Biophysics (5140); Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.
2. Forty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of credit for course 5000).
3. For admission to candidacy: Completion of any required prerequisite courses and one quarter of graduate course work with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.
4. A Master’s Committee of three approved faculty members upon admission to candidacy.
5. A thesis reporting results of original and significant scientific research.
Courses

The courses below are not necessarily available in teaching and for research roles in every academic year.

5000 Thesis

5070-80 Physical Chemistry for the Life Sciences (3, 3) Thermodynamics, phase equilibria: chemical equilibrium, chemical potential, free energy, surface chemistry, electrolyte solutions, kinetics, conductivity, viscosity, diffusion.


5140 Biophysics (3) Energy levels and excited states of large molecules; optical instrumentation; adaptations to system perturbations, properties of macromolecules in solutions; molecular conformations; inter- and intramolecular forces; physical principles of microscopy. Prereq: 5070-80.

5150 General Genetics (2) Mendelian genetics, mitosis, and meiosis. Transmission genetics, mapping, and linkage.


5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of eukaryotic cells. Pertinent instruments and techniques; meliosis and mitosis, cell cycle; chromosome structure; nuclear RNA metabolism; nucleoli and ribosome biosynthesis; survey of specialized cells. Structure of genetic transmission and translation in bacteria. Coreq: 5110.

5190 Cell Biology II (3) Comparative biochemical approach to cell structure and function. Membrane systems and metabolism; development and function of mitochondria, chloroplasts, peroxisomes and other organelles related to metabolism and regulation; transport phenomena; cell compactivity. Coreq: 5110.

5200 Mammalian Physiology (4) Mammalian organ systems and their functions. Nervous, muscular, endocrine, digestive, respiratory, circulatory, reproductive, and excretory systems. Interrelationships of these systems and fundamental importance of interactions in contemporary biological research. Prereq: 5190.

5230 Biochemical Concepts in Medical Sciences (3) Biochemical mechanisms involved in physiological and pathologic processes of human body. Dynamic functions of organ systems; biochemical pharmacology; hormone actions; neurobiochemistry. Current biochemical advances in basic and clinical medicine. Prereq: 5200, 5110-20.

5310-20-30-40 Biomedical Sciences Laboratory (3, 3, 3, 3) To acquaint students with both approaches and technologies in various areas of modern biology. Students spend a quarter in each of three or four laboratories conducting research in different areas of biomedical science. Required of all first-year students.

5350-60 Biomedical Sciences Seminar (1, 1) Critical analyses of current journal publications in selected area of modern biology. Written evaluation of papers and weekly preparation presentations by each student. Required of all first-year students.

5370 Biomedical Sciences Seminar (1) Basic principles of scientific writing. Research articles, grant and thesis proposals, abstracts, review articles, progress reports. Required of all first-year students.

5430-90 Graduate Research Participation (3, 6) Special advanced research project covering area not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

5510-20-30-40 Special Topics in Biomedical Sciences (3, 3, 3, 3) Tutorials or formal lectures. Potential topics include x-ray crystallography, x-ray state biophysics, chemical biology of macromolecules; computer science; pathology; cytology and cytogenetics; mammalian genetics; human genetics; cancer research; plant physiology; radiation biology; aging research. Additional courses developed on any subject of mutual interest to individual students and staff members. May be repeated.

5700 Developmental Biology (3) Principles of early embryogenesis and tissue interactions that initiate cellular differentiation and the mechanisms of differential gene action and regulation of protein synthesis pertinent to cellular differentiation. Prereq: 5070-80 or equivalent.

5740 Statistics for Biologists (3) Application and interpretation of statistical methods in data analysis. Random variations; normal, binomial, and Poisson distributions; statistical presentation of data; estimating means and variance; confidence intervals; tests of significance for comparing samples; analysis of variance; correlation tables; chi-square tests; correlation and association; linear regression. Prereq: Introductory statistics or consent of instructor.

5840 Bioorganic Reaction Mechanisms (3) Nature of chemical bond, nucleophilic and electrophilic reactions, molecular rearrangements, oxidation-reduction, enzymology, and nucleic acid modification reagents, reactions involving proteins and nucleic acids on polymer supports.

5860 Cryobiology (3) Physical and chemical properties of cells and biological systems at low temperatures and ice formation. Relation of these properties to permeability, structure of semipermeable membranes, conformation of macromolecules, and nature and state of water in cells; and how they bear on other fields of biology and medicine—including electron microscopy, photobiology, cell physiology, exobiology, ecology, and cryosurgery. Prereq: 5070-80 or equivalent, and 5190.

5920 Mammalian Genetics (3) Orderly presentation of known genetic variants affecting each organ system of experimental mammals, especially laboratory mice. Prereq: 5190.

5940 Classic Experiments in Genetics (3) Original papers presenting new and lasting concepts in genetics. Prereq: 5170.

6000 Doctoral Research and Dissertation

6110 Seminar in Plant Physiology (1) May be repeated. Maximum 12 hrs. S/NC only.

6120 Seminar in Cellular and Developmental Biology (1) May be repeated. Maximum 12 hrs. S/NC only.

6130 Seminar in Genetics (1) May be repeated. Maximum 12 hrs. S/NC only.

6140 Seminar in Mammalian Research (1) May be repeated. Maximum 12 hrs. S/NC only.

6150 Seminar in Immunology (1) May be repeated. Maximum 12 hrs. S/NC only.

6160 Seminar in Biophysics (1) May be repeated. Maximum 12 hrs. S/NC only.

6170 Seminar in Biochemistry (2) May be repeated. Maximum 24 hrs. S/NC only.

6180 Advanced Seminar in Biomedical Sciences (1-3) Presentation, evaluation and discussion of current research in various areas of biomedical sciences, including cell biology, genetics, biophysics, and biochemistry. Prereq: Consent of instructor. May be repeated. S/NC only.
6190 Seminar in Animal Virology (1) Discussion of experimental data and in-depth surveys of active research problems in virology through use of literature. Prereq: Microbiology 4521 or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.


6210 Protein Chemistry and Enzyme Mechanisms (3) Theoretical and practical aspects of protein chemistry including chemical and physical characterization of proteins, chemical modification of proteins, and structure-function relationships. Latter emphasizes enzymes, includes approximation of substrates, covalent catalysis, general acid-base catalysis, and strain and distortion of substrates. Prereq: 5110-20.


6240 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes, enzymic expression, and nervous tissue. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Prereq: 5110-20.

6270 Viral Carcinogenesis (3) History of viral oncology and descriptive catalog of tumor viruses. Biology of normal and transformed cells. DNA tumor viruses; replication cycle; transformation; genetics; natural history. RNA tumor viruses; endogenous and exogenous states; genetics; induction; transformation; natural history.


6290 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymology, metabolism; membranes; DNA repair; regulation; strategies in chemotherapy.

6300 Mutagenesis (3) Basic mechanisms in chemical and radiation mutagenesis and dosimetry in variety of systems including bacteria, fungi, Drosophila, and mice.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Current and future research developments. Topics listed under Special Topics Courses, can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.
The Graduate School of Library and Information Science provides a library education program leading to the preparation of librarians for work in all types of libraries. The programs of study of this School include the graduate curriculum leading to the degree of Master of Science in Library Science.

**MAJOR**  
Library Science  
**DEGREE**  
M.S.L.S.  

The goal of the program is to prepare graduates to function effectively in libraries and information centers. The program is designed to:

1. Enable students to examine critically the role and function of libraries and information centers in our society, and to define and redefine that role as the needs of society demand;
2. Enable students to understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Enable students to understand and apply the principles of management to the library and information center;
4. Enable students to assume individual and collective responsibility for the well-being and development of their profession and of professional service;
5. Enable students to make informed assessments and decisions regarding various career opportunities in libraries and information centers.

**PROGRAMS OF INSTRUCTION**

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 21 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis program is available, with 9 hours allowed for thesis credit. At least 36 hours must be taken in the Graduate School of Library and Information Science, allowing up to 15 hours outside the School. Upon completion of the program, all students are subject to an examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination. Programs are designed for persons interested in school libraries, public libraries, academic libraries, special libraries and information centers as well as a variety of library and information related activities.

**ADMISSION REQUIREMENTS**

The minimum grade point average for admission to the Graduate School is 2.5. Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the aptitude test of the Graduate Record Examination. The test should be taken at least one quarter in advance of application for admission to the Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language.

**APPLICATION PROCEDURE**

Admission to the programs in the Graduate School of Library and Information Science should be made in advance of the quarter for which admission is requested. Applicants should submit the "Application for Admission" form (printed as the first page of the Graduate School Catalog) and should request the registrars of all colleges and universities attended to send two official transcripts to the Graduate School. In addition, each applicant should make arrangements to take the GRE and TOEFL exams, if applicable. A personal data sheet and three recommendations (obtained from the Graduate School of Library and Information Science) should be returned to the Director of the School.

**FINANCIAL ASSISTANCE OPPORTUNITIES**

Employment with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus extend the period required for the degree up to two years.

Similar opportunities exist with some other libraries in the Knoxville area. A limited number of graduate assistantships are available through the School for the degree. Assistantships of this type carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in the School.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

**Faculty**

Professors:  
E. Mauldin, M.S.L.S. Illinois; G. R. Purcell, Ph.D. Case Western Reserve.

Associate Professors:  

Assistant Professors:  
J. Knightly, Ph.D. Texas; J. M. Pemberion, Ph.D. Tennessee; G. M. Sinkankas, Ph.D. Pittsburgh.

**Courses**

4160 Libraries and Librarianship (3) Librarianship as an occupation; its organization, responsibilities, problems and prospects.

4150 School Library Administration (3) Objectives, functions, and place of school library; relationship to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.)

4270 Organization of Library Collections (3) Acquisitions, cataloging and maintenance of library collections.
4330 Introduction to Reference Materials (3)
Basic information sources and services for all libraries.

4750 Utilization of Instructional Media (3)
(Same as Curriculum and Instruction 4750 and Vocational-Technical Education 4750.)

5000 Thesis

5002 Non-Thesis Graduation Completion (3-19)
Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities for the time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5110-20-30 Problems in Library Science (3, 3, 3)
May be repeated with consent of the School.

5140 Research Methods in Library Science (3)
Research methods applicable to librarianship. Process and conduct of research; analysis of published research.

5220 Sources and Services for the Social Sciences (3)

5240 Organization of Library Collections II (3)
Organization to meet needs, interests, and interests of group.

5300 Library Management (3)
Management and organization concepts applicable to libraries and librarians.

5310 Library Systems and Services (3)
National, state, and regional information systems. Design and analysis of existing systems within academic or special library sphere.

5320 Library and Information Networks (3) National and regional information systems. Design and analysis of existing systems within academic or special library sphere.

5330 Academic Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group.

5350 School Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group.

5360 Technical Libraries and Information Centers (3)
Purpose, functions, and organizational characteristics of those libraries and information centers, private and public, which offer scientific and technical information services. Problems related to acquisition, organization, and servicing of technical information collections.

5370 The Library in the Community (3) Persistent and current problems. Topics vary depending upon needs and interests of group.

5380 Seminar: Academic, Public, School or Special Libraries (3) Consent of Instructor.

5400 Library Facilities (3) Problems inherent in planning and construction of library quarters. Interrelationship of staff, materials, and user space requirements.

5600 Principles of Materials Selection (3) Bibliography methods and search techniques. Selection, acquisition, processing, storing, and servicing nonbook materials, with special attention to films, recordings, microforms, photo-copying.

5610 Mass Communications and the Library (3) Organization to meet needs, interests, and interests of group.

5620 Traditional Literature and Oral Narration (3) Organization to meet needs, interests, and interests of group.

5630 Critical History of Children's Literature I (3) Specific primary sources. Fifteenth century to 1920. Prereq: 5640 or consent of instructor.

5640 Critical History of Children's Literature II (3) Development of literature for children noting influence of cultural factors; emphasis on library collections, with special attention to films, recordings, microforms, photo-copying.

5650 Development of Literature for Children noting influence of cultural factors; emphasis on library collections, with special attention to films, recordings, microforms, photo-copying.

5691 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 5691.)

5700 Automation of Library Processes (3) Analysis of application of data processing methods to basic library operations such as bibliographic control, technical processes, circulation control, and management functions.

5710 Introduction to Information Science (3) Content and method of information science; application of research findings to general library practice.

5720 Information Systems Analysis and Design (3) Elements in design and operation of information retrieval systems, including acquisition, indexing vocabularies, information representation, and organization, search procedures, and system evaluation.

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing performance of systems at arrival at generalizations with respect to theory, design and operation of information retrieval systems.

5999 Practicum (6 or 9 or 12) Opportunity to translate library theory into practice under guidance of qualified librarians. Prereq: Completion of 21-hr core curriculum plus approval of director.
The Graduate School of Planning offers a two-year graduate course leading to a degree of Master of Science in Planning with concentrations in land use, transportation, environmental, regional, administrative, health, and historic preservation planning.

The purpose of study is the education of professional planners, competent to handle positions of increasing technical and administrative responsibility. Graduates are candidates for professional service in regional, city, county, and metropolitan area planning agencies; in local, state, and federal agencies concerned with physical, economic and administrative planning; in private businesses and organizations dealing with urban problems; and in private consulting practices.

The curriculum is organized on a basis of six quarters, or 72 credit hours, and provides the student with core courses in planning theory, methods, and techniques, and also takes advantage of offerings at The University of Tennessee in related fields such as government, economics, geography, civil engineering, and sociology.

The course of study ordinarily requires two years with an optional work internship during the summer between the two years. Planning courses as well as related courses will be offered during the summer between the two years with an optional work internship option.

Core planning courses are taught by the faculty of the Graduate School of Planning. Related courses are taught by other specialists drawn from the University faculty. In addition, the services of experienced professional planners in TVA and other public and private organizations are called upon to broaden the scope of the students' understanding. A variety of outside speakers and seminar leaders provide insight into particular problems of significance to planners.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Both letters should be from teachers familiar with the applicant's undergraduate or, where applicable, graduate academic record. In the event the applicant has had planning experience, a third letter is required from a supervisor or other person familiar with the planning work of the applicant. All applicants who wish to be considered for financial assistance from the University or the Graduate School of Planning should submit recent Graduate Record Examination scores for the Aptitude (verbal and quantitative) portion of that test. All applicants are also requested to submit a statement of career goals. All inquiries concerning admission should be addressed to: Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37916.

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit.

The following courses are the required core curriculum for the M.S.P. degree: 5040, 5045, 5100, 5110, 5130, 5180, 5230, 5270, 5280, 5340, 5435, 5440, 5465, 5500, Sociology 5320 or Statistics 5211. Waivers can be made by the faculty where competence is demonstrated.

Each student will be required to demonstrate competence in individual research. This may take either of two forms.

Plan I—Complete a thesis for 9 hours credit.

Plan II—Complete a major study with acceptable documentation. In order to be eligible for the major study, the student must have earned a grade of B+ or higher in Research Methods II, have a 3.5 cumulative grade point at the time of approval of the major study proposal, and have completed at least 24 hours of graduate study. The student meeting these criteria may present a proposal for a major study which will include at least 9 hours of elective course work in an area of concentration. The proposal shall justify the area of study, the approach to the study, the method of final documentation, Approval of the documentation, which must include written documentation, is a prerequisite for graduation.

Students in the Graduate School of Planning are given a comprehensive written examination after approximately four quarters of course work. In addition to testing the knowledge of the student, the information thus obtained is taken into account in advising students concerning the study program they should undertake during the balance of their academic program to remove any indicated deficiencies.

Each student will be encouraged, but not required, to complete a work internship equivalent to at least two and one-half months of full-time work in a planning agency at approximately the mid-point in course work.
Faculty

Professors:

Associate Professors:

Assistant Professors:

Courses

4100 Survey of Planning (3) History of city development and of planning with special attention to the U.S. experience in urban and other levels of planning. State of the art, the process, the comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5005 The Planning Process (3) Identification and examination of generic aspects of planning process and planning techniques applied in variety of settings. Not for credit for M.S.P. degree.

5040 Communications for Planners I (1) Introduces basic communications, interpersonal and oral communications, graphic presentations, audiovisual equipment.

5045 Communications for Planners II (1) Graphic communications in planning. Maps and mapping, computer graphics, models and presentation graphics. Prereq: 5040.

5100 Theory of Planning (3) Analysis of nature and objectives of planning processes; role of planner and planning function in public decision-making. Prereq: 5045.

5105 Introduction to Planning (3) History of planning, familiarization with operations of contemporary planning, concept of systems, current trends and issues. Relationship between planning and society in which it occurs. Designed for GSP students.

5130 Planning Research Methods I (2) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making. (Same as Water Resources Development 5130.)

5135 Planning Research Methods II (3) Application of rigorous investigative techniques in solving planning problems, including statistical analysis and mathematical models. Urban and regional information systems as resource and tool in problem identification and solution. Prereq: 5105.

5145 Library Research for Planning (1) Survey of publications of interest to planners, including resources and research techniques. Use of facilities and collections of UTK library.

5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Water Resources Development 5160.)

5170 Planning for Historic Preservation (3) Planning for preservation, restoration and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local governmental role in preservation, designation of sites, legislative needs, financing and administrative organizations.

5180 Planning Analysis and Forecasting (3) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, and economic change with emphasis on forecasting techniques. Prereq: 5130.

5230 Urban and Site Design (3) Principles of design of residential subdivisions and some components of physical community such as shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience.

5235 Urban and Site Design II (3-6) Prereq: 5230.

5270 Planning and Transportation (3) (Same as Civil Engineering 5270.)

5280 Planning Methods (5) Tooling up studies; methods for preparation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5180.

5300 Regional Planning (3) Making planning process operative in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by state, single-purpose agency planning, and TVA. Prereq: 5100.

5310 State Planning (3) Evolution of planning function in state government, with emphasis on institutional environment in which planning occurs. Context and scope of state planning, and relationships with other branches and levels of government. Prereq: 5100.

5340 Implementation (3) Policy formulation, information systems, taxation, capital improvement programming, and other aspects of plan implementation. Programming public actions to affect development. Prereq: 5440.

5360 New Towns (2) Historical development of planned new towns and implications for national urbanization policy in United States; process by which new towns are created, from establishment of objectives to administration of development process and provision of public services; organizational alternatives for new town planning, development and management in context of past experience and future objectives. Prereq: 5110 and consent of instructor.

5380 Housing (3) Nature and demand for housing in U.S. and abroad with emphasis on U.S. experience. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing. Coreq: 5110 or consent of instructor.

5390 Futures (3) Alternative futures and their implications for future living patterns and community planning. Techniques of futures research.

5410-20-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. May be repeated. Prereq: Consent of instructor.

5435 Planning and Government (3) Governmental context within which planning occurs. Policy making as public process. Planning structures, powers, and policies.


5455 Urban Revitalization (3) Goals, principles and strategies for restoring and revitalizing cities. Review and analysis of historic, current and proposed public and private programs aimed at urban revitalization. Physical building and restoration activities as related to financial and administrative requirements. Relationship between construction oriented activities and economic and social development programs is emphasized. Prereq: 5110 or consent of instructor.

5460 Planning Administration (2) Planning agency management, program development, and agency finance. Prereq: 5435.

5465 Planning and Property Development (3) Process of urban physical growth and change with emphasis on functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 5440.

5560 Synthesis (3) Problem-oriented experience to integrate knowledge from previous courses. Interrelationships stressed; student required to use judgment in evaluation and creation of plans and policies addressed to real world situations. Extensive laboratory experience. Prereq: Required planning courses or consent of faculty.

5670 Social Planning (3) Theory, philosophy and implications of programs for planned social change. Consideration of major social planning issues in diverse fields of service; aging, corrections, education, health, manpower, mental health, social services. Prereq: Consent of instructor. (Same as Social Work 5670.)
The School of Social Work recognizes and enjoys the challenge of cultural pluralism in society and encourages applications for admission from minority group members. Through the planned inclusion of significant and pertinent racial and ethnic content in the curriculum, the School provides students with the educational background needed to take creative roles in the social work profession's efforts toward the elimination of racism and such other social ills as poverty, crime, neglect, and social injustice.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, 2014 Lake Avenue, Knoxville, Tennessee 37916.

AREAS OF PROFESSIONAL PRACTICE

Specializations within the School's curriculum prepare students for social work careers in such practice fields as criminal and juvenile justice systems; family and child welfare services in public and voluntary agencies; group services in neighborhood and community centers; health services; mental retardation; public welfare services; mental health services; manpower training programs; governmental and voluntary human services planning agencies; rehabilitation services; school social work; and social gerontology.

THE PROFESSIONAL CURRICULUM

The School of Social Work's curriculum is designed to provide the student with the basic components of professional competence through a progression of course work and supervised practice experience. Students may elect a thesis or non-thesis option. The two-year, six-quarter program includes a core curriculum, a specialization in one of two areas—social work treatment or social welfare administration and planning—and concurrent field practice.

The Core Curriculum

The core curriculum is offered during the first two quarters of the first year and is required of all students. It is a 30-quarter-hour sequence of five basic courses. As the initial phase of the School's educational program, the core curriculum contributes to the process of socialization and professional identification, and presents students with a comprehensive and broad knowledge base from which to operate in the future as practitioners and administrators.
AREAS OF SPECIALIZATION

Social Work Treatment
Social work treatment deals with those individual, family, and group methods utilized to enhance the social functioning of individuals, effectively ameliorate problems of social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methods basic to the individual, family, and group methods applicable in the treatment of diverse client problems.

Social Welfare Administration and Planning
Social welfare administration and planning deals with the design, implementation, and continued operation of effective programs for client service. Specifically, the method deals with assessment of client characteristics, development of environmental resources, design of effective organizational structures, program staffing, development, program evaluation, social planning, neighborhood and community development, financing, and coordination of services.

Field Practice
Field practice is a critical component of the student's first- and second-year program. Because the School of Social Work cooperates with a wide range of social agencies and human service programs in the principal cities in Tennessee and areas immediately adjacent to the State, the School is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agency and the field instructor to insure that the student has a quality field practice experience which meets the objectives of the core curriculum and the specialization.

The first-year curriculum is on a concurrent class and field plan, with students engaged in classroom study two or three days per week and in field practice the remainder of the week. First-year agency placements are selected to provide the student with practice experiences related to the core curriculum content and beginning specialization. Within the placement, each student's experiences are planned and designed according to the educational needs.

In the second year, students are engaged full time in classroom courses during the fall quarter. The winter and spring quarter plan consists of a block field placement of four days per week and at least one concurrent classroom course each quarter. Second-year placements are selected according to the student's area of specialization, individual career interests, and educational needs. The student actively participates with the field practice coordinator and the specialization committee in selection of the second-year placement. The second-year field practice experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of full practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

DEGREE REQUIREMENTS
1. Satisfactory completion of the curriculum.
2. All courses taken as part of the degree programs, whether taken within the School of Social Work or outside, must be acceptable for graduate credit, relevant to social work and to the student's career objectives, and have the approval of the student's faculty advisor.
3. Achievement of a B average on all work presented for the Master's degree.
4. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
5. Students who elect a non-thesis option must pass a written comprehensive examination.
6. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.
7. The minimum number of credit hours required for the degree shall be 79 hours including a maximum of 36 S/NC hours.

ADMISSION REQUIREMENTS
Admission to the professional curriculum is based on the following requirements:
1. A Bachelor's degree from an accredited college or university with some preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in the social sciences, humanities, physical sciences, and other liberal arts subjects. Those with other academic backgrounds may request consultation regarding ways in which they might be admitted.
2. A grade point average of 2.5 on a 4.0 scale, with those falling below the average to be admitted on supplemental evidence of ability to perform at a satisfactory level.
3. Personal qualifications acceptable for entrance into the professional practice of social work.
4. Preference is given to applicants with a thorough knowledge of the theory and methodology basic to varied individual, family, and group methods applicable in the treatment of social dysfunction. The accelerated program begins in June in the Nashville Branch only with an intensive ten-week term from which students proceed in the fall into the regular second-year curriculum.

Application for admission to the accelerated program must be made through the regular admissions process. Applications should be filed no later than January 31 for the year in which admission is desired.

PART-TIME STUDENTS
Courses in the regular curriculum of the School are open to persons who meet the admission requirements for full-time study and who are planning to complete the work for the degree within the next two or three years. Application should be made to the School in the regular way, but the applicant should inform the Director of Admissions of the wish to begin part-time study on a planned basis.

TRANSFER CREDITS
Courses completed in another accredited school of social work are usually accepted for the University of Tennessee School of Social Work degree requirement providing the applicants meet the admission requirements of the Graduate School and The University of Tennessee School of Social Work, and if previous courses are equivalent to required or elective courses offered here. The University of Tennessee School of Social Work allows a maximum of 46 credit hours of graduate course work taken at another accredited institution to be transferred into the student's Master's program. Such work must have been taken for graduate resident credit and passed with a B or better. In addition, it must be part of an otherwise satisfactory graduate program (B average) and be approved by the branch director and the dean. This coursework must be completed within the six-year period prior to the receipt of the degree. In addition, S/NC credit earned for the field practicum is also accepted.

Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the School of Social Work and the student's major professor.

Faculty
Professors:
M. H. Bloch, M.S.S.A.; R. C. Bonovich, D.S.W.;
G. W. Fryer, Ed.D.; B. P. Granger, Ph.D.;
B. E. Orchard, M.S.S.A. (Emeritus);
H. B. Spencer, M.S.S.W. (Emeritus).

Associate Professors:
L. Beasley, D.S.W.; B. J. Cleckley, Ph.D.;
C. T. Cruthirds, Jr., D.S.W.; J. C. Eades, Jr.,
D. P. Faust, Dr.P.H.; R. H. Kurland, Ph.D.;
K. Mullins, Ph.D.; E. M. Noee, D.S.W.;
J. D. Orent, M.S.S.W.; B. Rowan, Ph.D.;
H. Rubenstein, Ph.D.; D. A. Sullivan, M.S.;
H. H. Vaughn, M.S.S.W.; M. E. Whitley,
M.S.S.W.; P. G. Zbicinski, M.S.S.W.

Assistant Professors:
J. Gates, M.S.W.; J. W. Jorgenson, D.S.W.;
J. A. C. Kaim, M.S.S.W.; M. Videh, M.S.;
M. Feit, Ph.D.; A. R. Ford, M.S.W.; V. A. Gates,
M.S.W.; R. G. Ford, M.S.; R. L. Harrison,
M.S.S.W.; M. Harkleroad, M.S.S.W.;
W. D. Harrison, A.C.S.W.; H. Hirayama, D.S.W.;
within context of functions, structures, roles and processes. Behavior of these systems conceptualized along functional-dysfunctional and normal-deviant continuum. Organizing themes, development and maturation, adaptive and dysfunctional. A systematic approach used to understand interrelationship of biological, psychological, and social variables with emphases upon contexts of culture and ethnicity.

S290 Special Accelerated Program in Social Work (15) Ten-week program providing qualified students with intensive academic and field practice experiences that qualifies them to enter second year of graduate study upon successful completion of this term. S/NC only.

S310 Human Behavior and Social Environment (2-3) Descriptive and explanatory knowledge of range of adaptive behavior; continuum of behavior from optimum social functioning through pathology. Prereq: Second-year status. May be repeated.

S311 Imaginative Perspectives on the Human Condition (2-3) Examination of usefulness to social work students of prose, drama, and poetry, which illuminate and expand knowledge and appreciation of every person's humanity. Adaptation, development of extraordinary and ordinary life situations and events, portrayed by creative writers. Artistic representation of life situations and events and through interaction of persons with one another and with society. Prereq: Completion of core or consent of instructor.

S512 Psychopathology and Social Deviance (2-3) Theories of and recent research in etiology of psychiatric dysfunction and social variance. Categorical approach and differential differentiation from other approaches to human behavior. Prereq: Completion of core or consent of instructor.

S513 Deviant Behavior of Children and Youth (2-3) Deviant behavior and conduct disorders in children and youth, etiology, symptomatology, and range of social services and treatment modalities. Prereq: Completion of core or consent of instructor.

S514 Comparative Theories of Personality (2-3) Those personality theories with most relevance for social work practice with individuals, groups, or families. Prereq: Completion of core or consent of instructor. Taught at branches only. Available at UT as Psychology 4510.

S515 Human Sexual Problems (2-3) Desensitization and resensitization of personal and sexual attitudes toward sexual behavior, clinical problems associated with clients, and assessment and treatment of sexual problems. Prereq: Completion of core or consent of instructor.

S516 Mental Health and Employment (2-3) Work as major life task and value, attitudes toward work, patterns of employment, effect of changing technologies on individual and community, interdependence of individual and organizational meaning of work in assessing mental health. Prereq: Completion of core or consent of instructor.

S519 Social Work Practice I (3) Basic theory, values and beginning skills development general to social work intervention at various system levels. Includes classroom skills and laboratory experiences.

S520 Social Work Practice II (3) Assessment, planning, methodology and skills development under mental health social intervention. Includes classroom skills and laboratory experiences.

S540 Family Therapy in Social Work Practice (2-3) Application of concepts and principles to ordinary social work work in assisting acquisition of skills in treatment of family as unit. Prereq: Completion of core or consent of instructor.

S541 Transactional Analysis (2-3) Philosophy, theory, therapeutic techniques of transactional analysis. Lectures, discussion, and experiential methods facilitate acquisition of knowledge and skills to use transactional analysis as treatment modality. Prereq: Completion of core or consent of instructor.

S542 Short-term Treatment (2-3) Theory and practice of short-term treatment focusing on nature of methods, characteristics of clients responsive to this approach, and designs of programs providing short-term treatment services. Specific techniques of assessment and treatment applied to course work with crisis. Prereq: Completion of core or consent of instructor.

S543 Seminar on Behavior Therapy (2-3) Behavioral application of principles of clinical assessment, choice of designs to assess treatment interventions, skill in evaluating data on effectiveness of treatment interventions. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 6 hrs.

S544 Social Work Practice with the Poor (2-3) Problems, issues, and dilemmas of practice in social services with poor and attributes of service delivery systems which make that practice possible. Prereq: Completion of core or consent of instructor.

S546 Social Work Practice with Individuals and Families (3) Social work literature, social case work as method of social work practice and as form of interpersonal treatment. Prereq: Completion of core or consent of instructor.

S570 Contemporary Treatment Modalities: Individual and Family (2-3) Well-established and developing therapeutic methods and techniques, focusing on essential concepts. Differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor.

S571 Comparative Methods of Group Treatment (2-3) Comparative analysis and critical review of theory and methodology of some of major group treatment methods with emphasis on group functioning, enabling problem-solving effective group, facilitating transfer of change, and evaluating individual change and group effectiveness. Prereq: Completion of core or consent of instructor.

S581 Transactional Analysis (2-3) Training in interpersonal competence in application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

S582 Community Organization (2-3) Development of social work generalist concept and knowledge of group methods in social work practice: organizing and forming group, structuring group tasks and experiences, understanding and enhancing group functioning, enabling problem-solving effective group, facilitating transfer of change, and evaluating individual change and group effectiveness. Prereq: Completion of core or consent of instructor.

S581 Social Work Practice in Rural Communities (2-3) Characteristics of rural populations and rural community analysis. Outline and analysis of rural social services and delivery systems. Development of social work generalist concept and occupational function in rural areas. Prereq: Completion of core or consent of instructor.

S586 Community Organization (2-3) Using behavioral and social scientific knowledge about communities and organizations to assist in development of resources to meet human needs. Prereq: Completion of core or consent of instructor.

S587 Planning and Management of Change in Social Welfare (2-3) Theories and models of change such as planned change, conflict, and evolutionary change in relation to organizational change. Community improvement, locality development, and economic development related to social welfare services. Prereq: Completion of core or consent of instructor.

S587 Administration in Social Work (2-3) Introduction to administrative practice as it relates to social work purpose and values and development tools.
5702 Organizational Design of Social Welfare Agencies (2-3) Critical problems of adapting organizational structure and operational patterns to new tasks, objectives, and mandates. Planning and design techniques for new programs and for modification of existing programs for appropriate deployment of resources and personnel for maximum effectiveness and efficiency. Integration of theory and experience for development of practical tools for coping with varied situations. Prereq: Second-year administration or community organization students; or consent of instructor; 5761 or equivalent.

5741 Supervision in Social Work (2-3) Dual roles of supervisor in various settings, and supervision distinguished from consultation and from direct practice. Responsibility and accountability to client system, supervisee, and executive, problems of middle management position of supervisor. Differences and similarities in supervision of varying levels of personnel. Goals, tasks, techniques, and processes in relation to individual and group supervision and field instruction. Prereq: Second-year status or consent of instructor.

5742 Consultation in Social Work (2-3) Constellation of roles, relationships, and behaviors required of consultation distinguished from supervision, administration, and direct practice. Types of consultation in relation to various settings and levels of responsibility. Processes and practices of consultation and dilemmas and pitfalls of consultant's position. Prereq: Second-year status or consent of instructor.

5743 Management of Human Resources in Social Welfare (2-3) Personnel function in administration of human service programs and agencies. Personnel recruitment, selection, appointment, and supervision; staff development, training, and evaluation; salary and benefit systems; employee-employee relations; and fair employment practices. Prereq: Completion of core or consent of instructor.

5744 Education and Training in Social Welfare (2-3) Philosophies and practices of teaching and learning related to adults in social work and social welfare. Distinctions between teaching and learning; training and education; unique aspects of adult learning; measurement issues; models and styles of education. Prereq: Completion of core or consent of instructor.

5745 Professional Leadership in Social Work (2-3) Leadership in social welfare. Theories of leadership; complexity of leadership; functions and effectiveness, and satisfactions of leaders; leadership styles, values, motivation, and morale; and leadership development and training. Prereq: Completion of core or consent of instructor.

5761 Social Welfare Administration and Planning (3) Topics significant to managerial-planner role such as decision making, budgeting, planning, and programming. Prereq: Completion of core or consent of instructor.

5762 Seminar in Social Welfare Administration and Planning (3) To assist students in acquiring specific administrative and planning techniques appropriate for social welfare delivery systems. Prereq: Completion of core or consent of instructor.

5771 Information Systems and Decision Making (2-3) Decision making in human services organizations, utilization of information in policy formulation and delivery of services, and evaluation of organizational performance. Information generation, collection, processing, storage, retrieval, and utilization in management and decision making; evaluation and forecasting. Prereq: Completion of core or consent of instructor.

5772 Financial Management for Social Welfare Administration (2-3) Centralized decision making related to allocation of scarce resources in social service organizations. Technical aids to budgetary choice and other aspects of financial management examined for utility, parsimony, and feasibility. Prereq: Completion of core or consent of instructor.

5800 Management of Residential Settings (2-3) Issues and trends in management and programming in residential institutions for children, aged, mentally ill, mentally retarded, juvenile and adult offenders, and other groups. Prereq: Completion of core or consent of instructor.

5812 Organizational Perspectives in Juvenile Justice (2-3) Aspects of juvenile justice system: overview of juvenile delinquency, introduction to theories of causation, role of police in detecting delinquency and apprehension of delinquent offenders, police procedures, role of juvenile court, alternatives to institutions, correctional institutions, aftercare programs, and preventive strategies. Prereq: Second-year standing.

5820 Social Aspects of Illness (2-3) Social, economic, and emotional problems arising from or related to illness and disability as they affect individual, family, and community. Services needed to obtain optimum results from medical care. Lectures, discussion, illustrative case material.

5825 Drugs: Use and Abuse (2-3) Survey and analysis of social, cultural, medical, and psychological factors underlying alcoholism and drug abuse, recent research and treatment innovations, social work with user and family. Prereq: Completion of core or consent of instructor.

5826 Social Work Treatment for Marital Adjustment (2-3) Theories regarding social and cultural values and personality processes which gain expression in marriage, concepts regarding contemporary marriage styles, problem areas in marriages, and appropriate treatment approaches. Prereq: Completion of core or consent of instructor.

5830 Law and Social Work (2-3) Basic principles of law which relate to social work practice: organization of courts; legal aid societies; and other problems of legal nature that affect social work.

5860 Social Gerontology (2-3) Physical, psychological, and social aspects of aging; economic and health status of aging; older person and family; community programs for aging; retirement—phenomenon of modern society.

5865 The Roles of Women (2-3) Roles and statuses of women; emphasis on contemporary American scene. Empirical research as well as popular literature. Ascribed and achieved facets of women's statuses.

5910-20 Field Practice (3, 4) Instruction and supervised practice in methods of social work with individuals, groups and communities. Prereq: Admission to the School; 5410 concurrently or prior to 5910; 5420 concurrently or prior to 5920. Must be taken in sequence. Required course. S/NC only.

5930-40-50 Field Practice (4, 8, 8) Specialized instruction and supervised practice in methods of social work practice, administration, and planning in community health and welfare programs and agencies. Prereq: Admission to the School. Must be taken in sequence. S/NC only.

5951 Integrative Seminar (2) Required seminar facilitates integration of two-year M.S.S.W. program; attention given to current issues in profession and to pressing social problems. Student participation in symposia, discussions, simulations, and gaming situations prepares graduating student to assume positions of responsibility and leadership within profession. Graduating student helped to plan toward continuing his/her education and professional development. S/NC only.

5960 Practicum in Governmental Social Welfare Policy Making (2-3) Practical introduction to process of legislative and/or administrative policy making at state or local governmental level, through assignment of students to offices of elected or appointed proximate policy makers. Limited social welfare policy research activities. Seminar to present normative and descriptive theory about policy-making processes, and models of policy analysis. Prereq: 5110 and consent of instructor. May be repeated.