Institute of Agriculture

W. W. Armistead, Vice President
Bobby H. Pentecost, Assistant Vice President

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 been 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 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.

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, Milan, Grand Junction, Spring Hill, Springfield, Lewisburg, Crossville, Greeneville, Martin and a forestry branch station at Oak Ridge. Professional and technical staff are in residence at these locations.

Agricultural Extension Service

M. L. Downen, Dean
T. W. Hinton, Associate Dean
M. F. Clarke, Assistant Dean
B. G. Hicks, 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 95 counties of the state. Educational 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 intent of Extension by a specialist staff, members of which are stationed either in Knoxville, Nashville, or Jackson.

The Agricultural Extension Service operates 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 growth 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 the college. The graduate program may be entirely in one major subject or may include subject matter areas related to the major.

Both majors and minors are available in Agricultural Economics, Agricultural Engineering, Agricultural Extension, Agricultural Mechanization, Animal Science, Entomology and Plant Pathology, 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 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 for graduate study is 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 Entomology and Plant Pathology 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 and the Department of Forestry, Wildlife and Fisheries.

The non-thesis option with a major in Agricultural Economics has the following minimum requirements:

1. 48 hours of course work of which 32 hours must be at the 5000-level or above.
2. 18 hours in agricultural economics.
3. 9 hours of economic theory.
4. 6 hours in quantitative methods in agricultural economics, statistics, or mathematical economics.
5. Final comprehensive written and oral examination.

Requirements of the non-thesis option for the Master of Science degree with a major in Forestry are as follows:

1. 50 hours of course work of which 34 hours must be at the 5000 level or above.
2. An advisory committee of not less than 3 faculty members will be selected. At least one member in addition to the major professor will be from the Department of Forestry, Wildlife and Fisheries. The committee will meet and schedule the student's program during the first quarter in residence.
3. Forestry 5011 (3).
4. 12 hours of course work in the Department of Forestry, Wildlife, and Fisheries at the 5000 level or above, exclusive of Forestry 5011.
5. 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, Food Technology and Science, 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 to candidacy for degree apply to all doctoral programs. In addition, the College of Agriculture requires:

1. Minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of the credit for the Master's thesis. Of this number, students are required to complete a minimum of 36 quarter hours in 6000 Doctoral Research and Dissertation.
2. A minimum of 30 quarter hours credit will be in courses numbered 5000 and 6000, exclusive of Doctoral Research and Dissertation.
3. Forestry 5011 (3).
4. At least 36 quarter hours credit in courses at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation. At least 9 of the 36 hours must be in 6000-level courses.

Food Technology and Science

Concentrations:
1. Food products
2. Food chemistry
3. Food microbiology

Supporting studies will be required to provide fundamental training in sciences related to the student's specialized area. Various commodity interests can be emphasized in all three areas by judicious selection of courses and dissertation topics.

Additional Course Requirements:
1. At least 36 quarter hours credit in courses at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation. At least 9 of the 36 hours must be in 6000-level courses.
2. A minimum of 9 hours of courses for graduate credit outside of the Department of Food Technology and Science.

Plant and Soil Science

Concentrations:
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.

Additional Course Requirements:
1. At minimum of 30 quarter hours credit must be completed in courses numbered above 5000 exclusive of Doctoral Research and Dissertation, of which 9 must be in courses numbered above 6000.

Departments of Instruction

Agricultural Economics and Rural Sociology

MAJOR

Degree Agricultural Economics

Professors:
J. A. Martin (Head), Ph.D. Minnesota;
M. B. Badenhoop, Ph.D. Purdue; J. R. Brooker, Ph.D. Florida; C. L. Celand, Ph.D. Wisconsin; I. Dubov, Ph.D. California (Berkeley); L. H. Keller, Ph.D. Kentucky; T. H. Kintz, Ph.D. Kentucky;
F. O. Leuthold, Ph.D. Wisconsin; D. L. McLemore, Ph.D. Clemson; B. R. McManus, Ph.D. Purdue; S. D. Mundy, Ph.D. Tennessee; C. B. Sappington, Ph.D. Illinois.

Associate Professors:
M. Cuskadens, Ph.D. Michigan State; R. H. Orr, Ph.D. Illinois; R. W. Todd, J. D. Tennessee;
O. N. Walker, Ph.D. Oklahoma State.

Assistant Professors:
W. M. Park, Ph.D. Virginia Polytechnic Institute; G. D. Whipple, Ph.D. Washington State.

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

5120 Farm Management (3) Principles of farm organization and operation; nature of managerial processes; economic aspects of crop, livestock, labor, and machinery planning; use of budgeting techniques in farm planning. Prereq: Agriculture 1110 and Economics 2120. 2 hrs and 1 lab. F, W

4140 Agricultural Production Economics I (3) Application of microeconomic theory to problem of resource allocation, product selection, scale of operation of agricultural firms; economic interpretation of technical agricultural production relationships. Prereq: Agriculture 1110 and Economics 2120. W

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

4250 Agricultural and Rural Planning (3) Decision-making concepts applied to design and implementation of local action programs. Case examples from the U.S. and other countries. Prereq: Agriculture 1110 and Economics 2120, or consent of instructor. Su

4310 Agricultural Finance (3) Nature and source of capital; credit problems of farmers; kinds and sources of farm credit. Agricultural insurance and taxes. Prereq: Agriculture 1110 and Economics 2120. W

4320 Agricultural Policy (3) Meaning of agricultural policy in democratic society; relationship of farm governments with the public; implications given to policy; agricultural policy and appraisal of results; policy problems. Prereq: Agriculture 1110 and Economics 2120. W

4330 Land Economics (3) Problems and policies of land use, conversion, development, taxation, tenure; population growth and demand for land; principles and theories of rent, property, value, and income. Prereq: Agriculture 1110 and Economics 2120. Sp

4610 Management of Farm Supply and Marketing Firms (3) Operation of supply firms selling farm supplies and merchandising agricultural products. Emphasis on accounting data and economic theories for decision making. Prereq: Agriculture 1110 and Economics 2120. F

4630 Advanced Agricultural Marketing (3) Economic interpretation of agricultural firms; marketing theory and practice; basis for analysis of market structure in agriculture; source allocation, product selection, scale of operation of agricultural firms; economic interpretation of technical agricultural production relationships. Prereq: Consent of instructor. Sp

5410 Agricultural Marketing Analysis (3) Analysis of structure, conduct, and performance of agricultural marketing system; application of price theory concepts to marketing systems; methods used to examine industry conduct and performance. Prereq: Economics 3110 or consent of instructor.

5420 Advanced Land and Natural Resource Economics (3) Economic efficiency in natural resource allocation; analysis of pricing and quality evaluation. Prereq: 4330 and Economics 5110, or consent of instructor.

5440 Economics of Agricultural Development (3) Role of agriculture in overall economic development; impacts of world food situation on people, environment, development; natural and human resources for food production; new theories on agriculture and change; national and international food policy. Prereq: 4540 or consent of instructor. W

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. W

5710 Linear Programming (3) Techniques with emphasis on applications relating to linear programming in agricultural and related industries; problems of production, consumption, and distribution in agriculture and related industries; methods used in agricultural and related industries. A

6120 Seminar in Agricultural Economics (3) Topics selected from the areas of economics of production, consumption, and distribution in agriculture and related industries and public policies concerned with agriculture and related industries. A

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6120 Seminar in Agricultural Economics (3) Topics selected from the areas of economics of production, consumption, and distribution in agriculture and related industries and public policies concerned with agriculture and related industries. A

6210 Agricultural and Rural Transformation Problems (3) Systematic evaluation of policy and development proposals related to agricultural modernization, food supply, and rural living. Decision-making process and useful roles of social scientists. Analysis of current issues in U.S. and developing nations. Prereq: Consent of instructor. Sp

6410 Agricultural Supply Analysis (3) Estimating agricultural supply relationships using aggregate time series data. Estimation of linear, non-linear, programming, and simulation and firm growth models with emphasis on the applicability between theoretical concepts and model attributes. Prereq: 5130 or consent of instructor. A

6420 Marketing and Resource Use (3) Institutional tools for research and policy formulation; analytical tools to measure efficiencies of marketing and resource use; emerging problems in marketing and resource use. Prereq: 5410 or consent of instructor. A

Rural Sociology

3420 Rural Sociology (3) Nature of rural society; social and urban differences; nature of social relations; population characteristics and movement; problems of rural people; tenancy, farm labor, health, services, educational facilities, church and local government; impact of industrialization. F, W

4450 Diffusion of Agricultural Technology (3) Analysis of diffusion process whereby new technological spreads from scientists to final adopters. Adoption process, communication behavior, mass media, role of professional change agents, opinion leadership, opinion process and adoption hypothesis. Prereq: 3420 or consent of instructor.

5340 Special Problems (3) Special topics in rural sociology. Prereq: 3420 or consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E

5340 Special Problems (3) Special topics in rural sociology. Prereq: 3420 or consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E

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

5450 Advanced Rural Sociology (3) Application of sociological concepts to analysis of change and function of rural life; rural social values, attitudes, and norms as they influence the family, formal and informal organizations, culture change, and rural farm technology. Prereq. 3420 or equivalent. W

4700 Research Problems in Rural Communities (3) Emphasis on problems that arise in survey research in rural areas. Sampling procedures, questionnaire construction, interviewer selection, training, control, and legitimization needs. Prereq. Undergraduate course in statistics.

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

Agricultural Engineering

MAJORS

DEGREES

Agricultural Engineering

M.S., Ph.D.

Agricultural Mechanization

M.S.

M.S.

Ph.D.

Agricultural Engineering

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5410 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery; adaptation planning for sequential operations; machinery for winter and summer production; and harvesting systems; operational management. Prereq: 4210. 2 hrs and 1 lab. Sp.

5610 Selected Topics in Agricultural Mechanization (3) Lecture, group discussion, and individual study on specialized agricultural mechanization developments. May be repeated. Maximum 9 hrs. F.

5440 Instrumentation in Agricultural Systems (3) Analysis of specific instrumentation needs in agricultural systems. Prereq: 3110 and consent of instructor. F.


5460 Research Problems in Agricultural Engineering (3) Theoretical and experimental studies relating to current problems in agricultural engineering. May be repeated. Maximum 9 hrs. E.

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 agricultural buildings, and other agricultural-engineering-related problems. Prereq: Engineering Science and Mechanics 3110 and 3310. 2 hrs and 1 lab. F, W.

6000 Doctoral Research and Dissertations (3-15) P/NP only. E.

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

6210 Long-range Extension Program Planning (3) Development of county extension programs based on effective interpretation of physical, social, economic characteristics of areas. Prereq: 3110 or equivalent. 2 hrs and 1 lab. F.

6110-20 Field Studies (3, 3) Supervised work experience with county extension agents in a designated county. Prereq: 3110 and consent of instructor. Requires living off-campus for a specified time. Su.

5000 Thesis (1-15) P/NP only. E.

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

5210 Long-range Extension Program Planning (3) Development of county extension programs based on effective interpretation of physical, social, economic characteristics of areas. Prereq: 3110 or equivalent. 2 hrs and 1 lab. F.

5220 Seminar (3) Review of literature and developments in agricultural extension methods. Prereq: 3110 or consent of instructor. Sp.

5230 Evaluation in Programs of Agricultural Extension (3) Theory and types of models, prediction equations; interpretations of physical, social, economic characteristics of areas. Prereq: 3110. 2 hrs and 1 lab. W.

5310 History, Philosophy and Objectives (3) Historical and philosophical foundation of informal adult education in agriculture. Prereq: History 1130 or 1131 and consent of instructor. W.

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 of place and importance of volunteer leadership function, techniques of effective leadership in small groups and methods of developing volunteer leadership in agricultural extension work. Prereq: 3110 or consent of instructor. W.

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

5100 Agricultural Extension Education MAJOR M.S.

Professors: R. S. Dotson (Head), Ph.D. Pennsylvania State; W. C. Cottle, Ph.D. Virginia Polytechnic Institute; L. H. Dickson, Ed. D. Cornell.

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

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

5000 Thesis (1-15) P/NP only. E.

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5000 Thesis (1-15) P/NP only. E.

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5330 Supervision of Agricultural Extension Programs and Personnel (3) Theories of human effectiveness; principles of successful supervision applied to various levels of county, district, and other extension programs, and planning for effective office management. Prereq: 5210 or 5220 or consent of instructor. W.
3810 Nutrition and Management of Laboratory Animals (3) Principles of feeding, breeding, and handling of animals in scientific investigations; specific species; requirements, peculiarities, and responses to which best fitted; laws governing use and handling of laboratory animals. Prereq: Agriculture 1130 and consent of instructor. 2 hrs and 1 lab. W

4210 Physiology of Lactation (3) Development, anatomy, and function of mammary glands; endocrine interactions for mammary development and milk secretion; factors affecting yield and composition of milk. Prereq: 3210. W

4220 Avian Physiology (3) Anatomy and physiology of avian species with emphasis on poultry. Prereq: 3210. 2 hrs and 1 lab. Sp

4230 Applied Reproduction in Farm Animals (3) Application of methods and techniques in collecting, evaluating, processing, and preserving semen; sterilization of females; pregnancy determination; gestation and parturition. Male and female infertility. Prereq: 3220 and consent of instructor. 1 hr and 2 labs. F, Sp

4330 Feeding Applications for Farm Animals (3) Detailed application of feeding principles designed to allow student to discover and explore feeding options available to producers through problem solving. Prereq: 3330. 1 hr and 2 labs. Sp

4340 Experimental Animal Nutrition Laboratory (2) Laboratory feeding trials to demonstrate basic anatomy and physiology of feeding preparation and feeding of experimental diets. Prereq: 3330. W

4810 Beef Cattle Production and Management (4) Principles of nutrition, physiology, and breeding in a complete beef cattle management program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives in terms of production response and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, Sp

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

4830 Pork Production and Management (4) Integration of principles of nutrition, physiology and breeding in a complete pork production and management program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives in terms of production response and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, Sp

4840 Poultry Production and Management (4) Structure of poultry industry, organization and management of poultry enterprises including rearing, housing, feeding, processing and marketing. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W

4850 Light Horse Production and Management (4) Integration of principles of nutrition, physiology and breeding into light horse management program. Structure of industry, systems and practices of production, nutrition, and management systems of production, production practices and herd improvement programs; tack, equipment and facilities for both pleasure owners and commercial producers. Alternatives in terms of pleasure, recreation and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. Sp

4860 Lamb and Wool Production and Management (4) Integration of principles and selection, nutrition, breeding, physiology and marketing into complete lamb and wool production and management program. Structure of industry, enterprise establishment, systems of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W

5000 Thesis (1-15) P/NP only. E

5011 Problems in Lieu of Thesis (1-6) May be repeated. Maximum 12 hrs. E

5110 Special Problems in Animal Science (1-6) May be repeated. Maximum 9 hrs. E

5210 Endocrine Relations in Animal Production (4) Endocrine glands related to growth and reproduction; hormone preparation for altering growth and reproductive rates. Prereq: 3210 or consent of instructor. 2 hrs and 1 lab. W, A

5230 Advances in Mammalian Reproduction (4) Germ cell development, maturation, transport metabolism, and preservation; fertilization and embryonic mortality. Prereq: 3250 or 4230. 2 hrs and 1 lab. W, A

5240 Advanced Studies of the Secretion of Milk (3) Effect of endocrine and nutritional factors on mammary gland development; initiation and maintenance of lactation. Prereq: 4210. 2 hrs and 1 lab. Sp

5311 Analytical Techniques in Animal Nutrition (3) Physical and chemical analyses of feeds, ingredients, and biological fluids associated with nutrition research. Prereq: 3510 and 3520. 3 hrs and 1 lab. F, A

5333 Nonruminant Animal Nutrition (4) Physiological development of nutrition, digestion and assimilation by nonruminant species; system of nonruminant animal during the life cycle. Concepts and methodology concerning nutrient requirements, interrelationships, availability and deficiencies of nutrients. Nonnutritive additives, toxins, poisons, and disease effects, nutritional effects on products. Prereq: 3210, 3330 or consent of instructor. 3 hrs and 1 lab. W

5344 Ruminant Animal Nutrition (3) Digestive physiology of the ruminant stomach, rumen fermentation, factors influencing rate of digestion, and feed intake regulations of ruminant animals. Prereq: 3330. F

5410 Genetics of Animal Populations (3) Population and individual, gene and zygote frequencies; statistical techniques; forces influencing genetic changes; application to animal breeding. Prereq: 3420 or consent of instructor. 2 hrs and 1 lab. F, A

5510-20 Advanced Animal Physiology (5, 5) Advanced animal physiology (primarily mammalian physiology): 5510—Membrane neuron, central nervous system, cardiovascular system, and control mechanisms. 5520—Respiratory, renal, gastrointestinal, and reproductive physiology, acid base mechanisms, and metabolism. Should be taken in sequence if both courses are taken. Prereq: General undergraduate anatomy and physiology and Biochemistry 4110 or equivalent or consent of instructor. Biochemistry 4120 also recommended. (Same as Zoology 5510-20) 4 hrs and 1 lab. W, Sp

5710 Methods of Evaluating Experimental Data in Animal Science (3) Interpretation of data from experiments in animal science based upon such statistical procedures as analysis of variance, covariance, linear regression and correlation, and multiple regression. Prereq: Statistics 5121 or equivalent. 2 hrs and 1 lab. W

5720 Design and Interpretation of Experiments in Animal Science (3) Review of principles of experimental design and application to research in animal science analyzing data from experiments with unequal and disproportionate subclass frequencies; interactions and procedures for use of computers in statistical analyses. Prereq: 5710. 2 hrs and 1 lab. Sp


6000 Doctoral Research and Dissertation (3-15) P

6211 Advanced Topics in Animal Physiology (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs. E

6220 Environmental Physiology of Farm Animals (3) Environmental factors and measurement; physiological mechanisms of response to environmental factors and measurement; interrelationship of animal and environment in terms of productivity and health. Prereq: Consent of instructor. 2 hrs and 1 lab. W, A

6230 Animal Growth and Development (3) Physiological and nutritional aspects of growth of farm animals; effects of growth rates on physiological and productive functions. Prereq: 5344, 5510, 5520 or consent of instructor. Sp

6240 Physiology of the Heart (4) Cardiovascular physiology: ultrastructural, biochemical, and physical effects. Latest techniques to assess myocardial function. Prereq: 5510-20, and upper division course in cell physiology and consent of instructor. 3 hrs and 1 lab. W

6311 Advanced Topics in Animal Nutrition (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs. E

6322 Advanced Animal Nutrition (3) Chemical forms, digestion, absorption, intermediary metabolism, deficiencies, excesses and interaction of nutrients, energy, proteins, vitamins, and minerals. Prereq: 5333 or 5344; and Biochemistry 4120 or Nutrition 5110; or consent of instructor. May be repeated. Maximum 6 hrs. Sp, F, Sp

6411 Advanced Techniques in Animal Breeding (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs. E

6420 Animal Breeding Research Methods and Interpretation (3) Obtaining valid estimates of genetic parameters in animal breeding studies; least squares adjustment of data; partition of variance; phenotypic, genetic, and environmental correlations; repeatability; heritability; and selection indexes. Prereq: 5410 and 5710. W, A

6510 Seminar (1) Animal nutrition, breeding, physiology and products. May be repeated. Maximum 6 hrs. W

6910 Seminar (1) Animal nutrition, breeding, physiology and products. May be repeated. Maximum 6 hrs. W

Entomology and Plant Pathology

MAJOR

FOREIGN

Degree Entomology and Plant Pathology M.S.

Professors: C. J. Southards (Head), Ph.D. North Carolina State; R. R. Gerhardt, Ph.D. North Carolina State; J. W. Hilly, Ph.D. Ohio State; L. P. Johnson, Ph.D. Louisiana State; C. D. Plass, Ph.D. Clemson

Associate Professors: E. C. Bernard, Ph.D. Georgia; P. L. Lambdin, Ph.D. Virginia Polytechnic Institute.

Assistant Professors: L. E. Klostermeyer, Ph.D. Nebraska; B. B. Reddick, Ph.D. Clemson.

6100 Biology of Soil Microorganisms (4) Morphology and physiology of microorganisms; decomposition of organic matter, chemical transformations and interactions between soil organisms and higher plants. Prereq: Introductory microbiology or 3130. 3 hrs and 1 lab. Sp

6103 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. F, A

4140 Forest Pathology (3) Symptomatology, etiology, and control of forest tree diseases, including wood decay and other diseases important to urban and production forests. Prereq: 3130 or Forestry 3060. 2 hrs and 1 lab.
5000 Thesis (1-15) P/NP only. E
5010 Research Methods and Instrumentation in Plant Pathology and Entomology (3) Techniques for identification and detection of parasites affecting plant pathology and entomology. 1 hr and 2 labs. F
5110 Plant Disease Diagnosis (3) Diagnosis of plant diseases, disease symptoms, causal agents and control measures. Prereq: 3130.
5120 Insect Diagnostic Clinic (3) Identification of insects and insect damage to crops, livestocks and residences. Obtaining of insects and damaged specimens; diagnostic characteristics and control measures. Prereq: 3210 or Zoology 3110.
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. W, A
5220 Plant Disease Control (3) Basic problems and principles involved in controlling plant diseases. Prereq: 3130. W.
5230 Field Crop and Vegetable Insects (3) Taxonomy, general biology, and control of insects affecting field and vegetable crops. Prereq: 3210 or equivalent course in applied entomology. 2 hrs and 1 lab. F, A
5240 Plant Virology (4) Symptomatology, cytology and transmission; structure, replication, transmission, purification, characterization, and classification of plant viruses; serology; virology of viroids, mycoplasmas and aphthoviruses. Prereq: 3130 or consent of instructor. 2 hrs and 2 labs. W, A
5250 Medical and Veterinary Entomology (4) Morphology, taxonomy, biology and control of arthropod parasites and vectors of pathogens of humans and animals. Ecology and behavior of vectors in relation to pathogen transmission and control. Prereq: 3210, general entomology, or consent of instructor. 3 hrs and 1 lab. Sp, A
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. W, A
5310 Special Problems in Entomology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E
5320 Special Problems in Plant Pathology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E
5330 Special Problems in Nematology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E
5410 Seminar (1) Review of literature and current research in plant pathology and economic entomology. May be repeated. Maximum 3 hrs. F, W, Sp

Food Technology and Science

MAJOR DEGREES
Food Technology and Science M.S., Ph.D.

Professors:
J. T. Miles (Head), Ph.D. Wisconsin; J. L. Collins, Ph.D. Maryland; H. O. Jaynes, Ph.D. Illinois; W. W. Overcast (Emeritus), Ph.D. Iowa State.

Associate Professors:

Assistant Professor:
J. R. Mount, Ph.D. Ohio State.

3020 Dairy Products I (4) Procurement, processing and distribution of industrial manufacture of fluid and condensed dairy products. 3 hrs and 1 lab. W

3840 Meat Science (3) Processining methods, carcass characteristics of meat animals; slaughter, cutting, selection, curing, freezing and cookery. 2 hrs and 1 lab. W, Sp

4010 Food Technology and Science Seminar (1-3) Review of literature; oral and written reports. May be repeated. Maximum 3 hrs. W, Sp

4030 Dairy Products II (4) Principles in the manufacture of butterfat and special dairy products. Prereq: 3020. 3 hrs and 1 lab. Sp, A

4130 Food Chemistry I (3) Minerals, fats, oils and vitamins in food as affected by processing and storage. Prereq: Nutrition and Food Sciences 3150 or equivalent. 2 hrs and 1 lab. Sp

4140 Food Chemistry II (3) Reactions of proteins, carbohydrates and natural food colorants in food materials. Protein structure, food enzymology and browning reactions. Effects of storage and processing on proteins and carbohydrates with emphasis on nutritional value and functionality. Prereq: Nutrition and Food Sciences 3150 or equivalent. 2 hrs and 1 lab. F

4200 Food Processing I (4) Prevention of spoilage and deterioration of foods. Methods of preservation. Prereq: Agricultural Mechanization 3510. 3 hrs and 1 lab.

4210 Food Additives (3) Substances used in food manufacturing with emphasis on properties and functions. Prereq: Nutrition and Food Sciences 3140 or equivalent. 3 hrs and 1 lab. Sp, A

4310 Food Packaging (3) Characteristics and application of materials and containers to packaging requirements and methods of packaging foods. Prereq: 2300. 2 hrs and 1 lab. Sp

4400 Food Processing II (5) Design of food quality systems; processes and equipment. Application of general analytical techniques, regulations and unit operations to quality control in food industry. Prereq: 3810. 3 hrs and 2 labs. W

4410 Food Crop Products (3) Food products from crops with emphasis on types, marketing systems, quality attributes, and utility. Sp, A

4420 Bakery Products (3) Baking ingredients and their interactions during production and storage of bakery products. Prereq: 4130 and Chemistry 2230 or equivalents. 2 hrs and 1 lab. Sp, A

4810 Food Microbiology II (4) Standard methods for examination, cultivation, and identification of bacteria associated with food spoilage and food poisoning. Prereq: 3810. 2 hrs and 2 labs. F

4840 Meat Products Manufacturing (3) Prepared meat products with emphasis on sausage making and information relating to cost controls, inspection, and meat science. Prereq: 3840 or consent of instructor. 1 hr and 2 labs. W

4920 Analysis of Physical Properties of Foods (4) Physical states of food materials, water, viscosity, colloids, gels, foams, crystals, color. Quantification and changes induced by processing. Prereq: 4200 and Agricultural Mechanization 3510 or consent of instructor. 3 hrs and 1 lab. W

4940 Advanced Meat Science (3) Qualitative and quantitative characteristics of meat and poultry as related to palatability, cookery, preservation, packing and merchandising. Prereq: 3840. F, A

5000 Thesis (1-15) P/NP only. E

5100 Seminar (1) Reports and discussions of selected topics from research literature. May be repeated. Maximum 3 hrs. F, W, Sp

5120 Food Color (3) Chemistry of natural food pigments and measurement, notarization, and preservation in food. Prereq: Nutrition and Food Sciences 3140 or equivalent. 2 hrs and 1 lab. Sp, A

5130 Food Enzymology (3) Commercial and native enzymes in manufacturing, processing, spoilage of food. Prereq: Nutrition and Food Sciences 3150 or equivalent, Sp, A

5140 Food Flavors (3) Food flavor maintenance and improvement. Natural and synthetic compounds in manufacture of foods with predictable consumer acceptance. Technology of flavor manufacture and formulation. Techniques for determining flavor profile. Prereq: 4210. 2 hrs and 1 lab. W, A

5150 Fats and Oils (3) Application of scientific principles to commercial technology of fats and oils. Prereq: 4130. 2 hrs and 1 lab. W, A

5200 Research (1-5) Research in selected areas. Completion of department head, credits and hours to be arranged. May be repeated. Maximum 10 hrs. E

5310 Food Products Development (3) Fundamentals of art, science, and technology applied to research, development, and marketing of new food products and processes. Prereq: 4210. 2 hrs and 1 lab. F

5320 Food Thermobiology (3) Fundamentals of heat transfer as related to rate of destruction of microbiorganisms and to rate of loss of food quality through calculation of minimum safe thermal processes for hermetically-sealed packages of foods. Prereq: 4200. 2 hrs and 1 lab. W, A

5420 Instrumental Analysis of Foods (3) Application of current instrumental techniques to control food manufacturing processes. Prereq: 4140. 2 hrs and 1 lab. F

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

5530 Advanced Food Microbiology (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. W

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6100 Advanced Topics in Food Technology and Science (1) Selected readings, discussions and presentations of current topics, topics to be announced in advance. May be repeated. Maximum 6 hrs. S/NC only, F, W, Sp

6410 Advanced Food Processing (3) Role of processing treatments in modification of food properties; texture, color, and flavor characteristics. Prereq: 5120, 5140, and Food Science 5510 or consent of instructor. Sp, A

Forestry, Wildlife and Fisheries

MAJORS DEGREES
Forestry M.S.
Wildlife and Fisheries Science M.S.

Professors:
G. Schneider (Head), Ph.D. Michigan State; J. W. Barrett (Emeritus), Ph.D. Syracuse; E. R. Buckner, Ph.D. North Carolina State; J. L. Byford, Ph.D. Auburn; H. A. Core (Emeritus), Ph.D. Syracuse; R. W. Dimmick, Ph.D. Wyoming; C. E. McIver (Adjunct) D. F. Duke; M. R. Pelton, Ph.D. Georgia; T. H. Riple (Adjunct), Ph.D. Virginia Polytechnic Institute, E. Thor (Emeritus), Ph.D. North Carolina State; J. L. Wilon, Ph.D. Tennessee; F. W. Woody, Ph.D. Tennessee.

Associate Professors:

Assistant Professor:
E. F. Dougall, Ph.D. Oregon State.
Forestry

"3020 Forest Environments and Ecology (3) Environments and ecology of forest ecosystems; relationship between forest ecosystems and their environments. Prereq: 4 hrs of biology, botany, or zoology.

"3040 Forests and Trees of Eastern North America (4) Forest formations and associations of North America east of Great Plains; dendrology and silvics of timber and shade trees; identification, nomenclature, and species-site relationships. Weekly field trips during scheduled labs plus one weekend field trip. Prereq: 8 hrs basic biology or botany. 3 hrs and 1 lab.

"3050 Forests and Trees of Western North America (3) Forest formations and associations of North America west of Great Plains; dendrology and silvics of forest species. Audiovisual presentation: edaphic, topographic, and climatic site variables as they control species distributions. 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. 3 hrs and 1 lab. W

"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. W

"3220 Forest Products and Utilization (3) Harvesting and processing of forest products in stand conversion, intermediate, and harvest cuts. Prereq: 3120. Sp

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

"4002 Utilization (3) Wood-using industries; processes for forest products, sawmills, tree-log-lumber grading; pulpwood operations, flooring plants, treating plants; plant layout, flow diagrams. Prereq: 3120 or consent of instructor. Sp

"4003 Field Methods of Timber Inventory (4) Field measurements of forest trees; timber cruising; determining appropriate sample design for specific purposes; tree and stand growth; site evaluation; field problems. Prereq: 3110 and Agricultural Mechanization 3140. Sp

"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 prescriptions. Prereq: 3260, 4006. S/NC only. Sp

"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: 3060, 3320, 4002. 4003. Sp

"4020 Forest Watershed Management (3) Water as a forest resource; role of forests in the hydrologic cycle; control of water quantity, quality, and regimen; watershed planning. Prereq. 3320 or consent of instructor. 2 overnight field trips. W

"4210 Forestry Organization and Administration (3) Planning, organizing, and leadership concepts and cases; problem analysis and decision making in forest resource management. Prereq: Consent of instructor. 2 hrs and 1 lab. F

"4220 Forest Resource Management (3) Decision-making principles, forestry as integration of resource uses. Models of forestry as system; concepts of forest resource and valuation; taxation of forest firm. Prereq: 4150.

"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, watershed services, and wildlife; productivity of timber and non-timber uses. Prereq: 3020, 4150 or consent of instructor. 6 hrs. W

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student understands the necessity of a complete plan based on optimizing forest uses. Prereq: 4210. Sp

4240 Interpreting Forest Resources (3) Principles and techniques of interpreting forest resources; importance of environmental interpretation to management of forest resources; development and administration of interpretive services; ideas and methods for overnight field trips required. Prereq: 3240 or equivalent. 2 hrs and 1 lab.

4330 Forest Policy (3) History of forestry in United States with emphasis on development of forest resources; current policies influencing development and management of forest resources; brief survey of policy implications of forest organizations in public and private sectors. Prereq: 4004. W

4340 Aerial Photography in Forest-Resource Management (3) Use of conventional aerial photography in forest resource management; interpretation of detail, aerial inventories, preparation of cover-type maps, uses of other remotely sensed imagery. Prereq: 3110 or equivalent. 1 hr and 2 labs. Sp

4420 Forest Tree Improvement (3) Forest tree improvement techniques and purposes of tree improvement and forest genetics; principles of tree cytology and population genetics; importance of trees required; selection of superior phenotypes and development of seed orchards, hybridization, seed production and seed certification. Prereq: 4006 or consent of instructor. 2 hrs and 1 lab.

4430 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; sites and site types, ecology, problems of protection, and silvical characteristics of the more important species. Prereq: 4006 or consent of instructor. W

4440 Forest Recreation (3) Forest lands as a recreation resource; the interrelationships of forest 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 1 lab. Sp

4450 Recreational Behavior in Forest Environments (3) Review of sociological and psychological theories related to recreation, management, and administration. Implication and application of behavioral concepts to forest recreation planning, review of methodologies for assessing recreational behavior. Prereq: 3240 and 6 hrs in behavioral psychology and/or sociology, or consent of instructor. W

4450 Wood Drying and Preservation (4) Concepts of wood drying including wood-moisture relations, specific gravity, moisture content, density, and shrinkage. Commercial drying practices. Relationship of wood moisture content to attack by wood destroying organisms. Methods and materials used in commercial drying systems. Prereq: 3120, Mathematics 1851, Physics 1220, or consent of instructor. 3 hrs and 1 lab.

4450 Wood Composites and Gluing (4) Fundamentals of plywood and composite product manufacturing. Wood adhesives technology. Application of gluing to manufacturing processes of plywood and composite products. 3 hrs and 1 lab. Overnight weekend plant trips may be required. 2 hrs and 1 lab.

4450 Forest Products Marketing and Measurement (3) Discussion of market structure for various sectors of forest products industry including standing timber, sawmills, paper mills, furniture, composite products, and treated products; measurement systems used by industry for sale and transfer of products. Prereq: 3220, 4150 or consent of instructor.

5000 Thesis (1-18) P/N/P only. E

Graduate course for non-forestry majors only.

5020 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. F, A

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. W, A

5240 Seminar in Forest Genetics (3) Population genetics and speciation; the role of forest genetics in certification of commercial woods; current policies for certification in forest trees; gains with different breeding methods; planning and conducting forest genetics research. Prereq: 4240, Biology 3110, and consent of instructor. W, A

5250 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated 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. W

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. F

5280 Seminar in Forest Biometry (3) Theory and application of forest measurements and sampling; tree, log and lumber quality; volume estimation techniques; growth and yield prediction. Prereq: 4003 or consent of instructor. W, A

5310 Seminar (1) Current developments in forestry. Required of each graduate student in residence Winter Quarter. May be repeated. Maximum 2 hrs. S/NC only. W

Wildlife and Fisheries Science

"3230 Wildlife Management (3) Lives and ecological relationships of wild animals; biological, social, and economic aspects of their management. 2 hrs and 1 lab. F

4450 Game Mammals (4) Classification, identification, distribution, natural history, and management principles of game mammals in North America. Prereq: 3320 or 1 yr of zoology. 2 hrs and 2 labs. F

4460 Game Birds (4) Biology, classification, identification, distribution, and management of game birds in North America. Prereq: 3320 or 1 yr of zoology. 3 hrs and 1 lab plus one weekend field trip. W

4510 Fish Populations (4) Principles and methods of fish population estimation; sampling techniques and equipment; population dynamics; age and growth. Prereq: Biology 3130, 8 hrs mathematics, or consent of instructor. 3 hrs and 1 lab or field period.

Graduate credit for non-forestry and non-wildlife and fisheries science majors only.
small and moderate scale landscapes situations.
Pre-
req: 3610, 3810 or equivalent. 1 hr and 2-3 hrs. F, Sp

3630 Landscape Construction and Contracting (4) Construction methods, materials and practices of
landscape installation and contracting. Site layout procedures, earthwork and drainage, landscape
construction materials; application through detail design drawings and small scale projects. Landscape
contracts, specifications and bidding procedures. Pre-
req: 3310, 3610; Agronomic Mechanization 2130
recommended. 1 hr and 2-3 hrs. Sp

4150 Nursery Production (4) Modern methods of
producing liners, field and container grown woody ornamental plants. History and evolution of nursery
industry and modern production recommendations for
woody ornamental plants. Prereq: 3030, 3810 and
Plant and Soil Science 2130. 2 hrs and 2 labs. F, Sp

4160 Nursery Management (3) Modern manage-
ment methods for wholesale and retail nurseries,
garden centers, and landscape contractors. Pre-
req: 3310. 2 hrs and 1 lab. W

4180 Park Design (4) Design criteria for parks and
outdoors recreation systems. Park site selection,
analysis, planning and management as related to
anatomy, physiology, and landscape. Evaluation of
aesthetic and functional quality of parks and
their impact on environmental quality of rural and
suburban communities. Pre-
req: 3620. 2 hrs and 2 labs. S, N only. W

4190 Advanced Landscape Design (4) Comprehensive
application of landscape design skills and knowledge through a major project. Analysis, programming, planting design,
construction detailing, estimating, specifications, and
contracting and bidding. Prereq: 3150, 3620, 3630. 1 hr and
2-3 hrs. labs. Sp

4220 Advanced Turfgrass Management (4) Principles
and scientific basis of turfgrass culture; adapta-
tion, ecology, physiology, soil fertility and grass nutri-
tion; climatic influences on grass culture; physiology of
clipping and water management; traffic effec-
tions and compaction; and the physiological influences of pest
infestations and climate measures. Pre-
req: 3510, 3 hrs and 1 lab. W

4320 Specialty Floriculture (3) Specific practices in
production of minor cut flower and potted plant
crops. Production methods for scheduling flowering
or vegetative growth of specialty florist crops in con-
trolled environments. Pre-
req: 3410. 2 hrs and 1 lab. W, Sp

4400 Individual Problem Study (1-5) May be re-
peated. Maximum 5 hrs. E

5000 Thesis (1-15) P/NP only. E

5160 Advanced Nursery Production (4) Prepara-
tion and use of growing media for woody ornamental
plants; nutrition of ornamental plants including de-
signation, prevention and correction of mineral de-
ficiencies; development of fertilization programs for
container and field grown ornamentals. Prereq:
4150; Plant and Soil Science 3110; Botany 3210. 3
hrs and 1 lab. W
4120 Principles of Crop Breeding (4) Genetic principles and applications for crop improvement. Prereq: Biology 3110 or equivalent. 3 hrs and 1 lab. W

4250 Agricultural Pesticides (4) Regulation of pesticide use; development of resistance; mixture effects. Prereq: 4110 or consent of instructor. 3 hrs and 1 lab. W, A

4320 Soil Formation, Morphology and Classification (4) Soil parent materials, basic pedogenic processes, soil morphology, and interpretation of morphology, taxonomic classification of soils. Use of soil surveys. Prereq: 2130 and 1 lab. W, A

4350 Soil Survey (2) Techniques of mapping soils, development of mapping legends and documentation and testing of mapping unit descriptions and interpretations. Prereq or coreq: 4520. 1 hr and 1 lab. Sp

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

4410 Crop Physiology and Ecology (4) Application of principles of plant physiology and ecology to crop production. Effects of environmental factors (light, heat, water, soil, etc.) on physiological processes. Prereq: 2130 or equivalent. 3 hrs and 1 lab. W, A

5710 Advanced Plant Genetics (3) Mutation systems: controlling elements, induced mutations, genome organization, polyploidy, tetrasomic inheritance, apomixis, incompatibility systems, and genetic engineering of higher plants. Prereq: Basic genetics or consent of instructor. F, A

5720 Quantitative Genetics (3) Genetic constitution of populations; quantitative genetics; recombination and measurement of continuous variation; estimation of variable components and genetic advances under different breeding procedures. Prereq: Biology 3110 or equivalent; 3610 or equivalent. W, A

5750 Advanced Plant Breeding I (4) Developing breeding program objectives; historical and theoretical development of concepts of components of variation, heritability, selection intensity, methods of selection, linkage in relation to selection, genotypic by environment interaction, and genetic resistance and vulnerability to pests. Prereq: 4120, 5310 or concurrent registration, or consent of instructor. 3 hrs and 1 lab. W, A

5760 Advanced Plant Breeding II (4) Concepts and utilization of heterosis, inbreeding, stability parameters, selection indices, methods of selection, and germplasm resources in breeding program for improvement of cultivated species. Prereq: 5750 or consent of instructor. 3 hrs and 1 lab. Sp, A

5810 Advanced Crop Climatology and Ecology (4) Quantification of climatic and meteorological factors affecting crop growth; world climates, crop distribution and productivity, and their interaction; general and specific relations among environmental factors, crop organisms and agricultural systems. Prereq: 3610 or equivalent; 4410, or Botany 3210 or 4310. 3 hrs and 1 lab. F, A

5820 Advanced Crop Physiology (4) Photosynthetic efficiency in field and relationship with evapotranspiration, Hardiness development and tolerance for field stresses: drought, cold, heat, flooding. Photosynthesis, flowering, and seed production. Nitrogen-fixing relations of bacteria with legumes and grasses. Prereq: 4410. 3 hrs and 1 lab. W, A

5840 Postharvest Physiology (3) Preharvest and postharvest factors affecting quality of stored fruits and vegetables. Synthetic and degradation processes in maturation and ripening of plants. Indices of plant maturation and quality. Handling and storage techniques for fruits and vegetables. Prereq: 4410. W, A

5850 Mechanisms of Herbicide Action (3) Principles and mechanisms of action and basis of selectivity of herbicides. Effects of herbicides on plant morphology, metabolic systems and enzymatic activities. Prereq: 4410; Biochemistry 4110 or consent of instructor. Sp, A

5855 Plant Growth Regulation and Control (1) Laboratory course in plant growth, regulation and control under field, greenhouse, laboratory and storage environments. Prereq or coreq: 9840, 5850, or 5560. May be repeated. Maximum 4 hrs. E

5860 Growth Control with Chemicals (3) Character, theories of action and use of plant growth regulators with special emphasis on practical aspects of use for controlling plant growth, development and metabolism to increase efficiency and production of agriculture production or scientific consideration to current commercial uses. Prereq: Botany 5210 or equivalent. Sp, A

6000 Doctoral Research and Dissertation (3-15) P/N only. E

6100 Topics in Soil Science (1-3) Student needs and interests determine course content. Genotype by environment interactions, estimation of quantitative parameters, mutations, chromosomal inheritance, inter and intraspecific hybridization, linkage, screening methods, genome organization. May be repeated. Maximum 9 hrs. E

6300 Topics in Crop Physiology and Ecology (1-3) Student needs and interests determine course content. Microclimatology of agroecosystems, crop dormancy and responses to stress, physiology of crop growth and reproduction, interaction of physiology and germplasm in crop production, theory and application of quantitative methods in crop physiology and ecology research. May be repeated. Maximum 9 hrs. E

6410 Experimental Designs (3) Principles of balanced and unbalanced designs used in agricultural research: use of linear models, dummy variables, simple multivariable linear models, response surfaces, discriminant analysis, multiple regression, heterogeneity of slopes, and other techniques. Prereq: 5310 and Statistics 4310 or equivalent. F, A

Institute of Agriculture/Veterinary Medicine 31

College of Veterinary Medicine

H. Kilchen, Dean
C. F. Reed, Associate Dean
W. H. Grau, Jr., Associate Dean

The College of Veterinary Medicine, established in 1974, offers a professional curriculum leading to the Doctor of Veterinary Medicine (D.V.M.). The college offers graduate studies leading to the degrees Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Residency training programs in the various clinical specialties are also offered.

The college is organized into six academic departments: Animal Science (jointly with the College of Agriculture), Environmental Practice, Microbiology (jointly with the College of Liberal Arts), Pathobiology, Rural Practice, and Urban Practice.

Primary objective of the college is to educate veterinarians for private practice. However, the professional curriculum provides an excellent basic medical education, in addition to training in diagnosis, disease prevention, medical treatment, and surgery. Graduates are qualified to pursue careers in many facets of veterinary medicine and related health professions.

Most veterinarians are engaged in private practice. The majority of these are in general practices which deal with the diseases of all kinds of animals. About one-fourth of the veterinarians in the United States are engaged exclusively in pet or companion animal practice. A growing number are engaged with the health problems of zoo animals, laboratory animals, wildlife, and aquatic species.

Veterinarians also find rewarding careers in the United States. Public deal with the diseases of the U.S. Army and Air Force, and in state, county, or local health agencies. A large number of veterinarians are employed by the U.S. Department of Agriculture and by state departments of agriculture for important work in livestock disease control, meat and poultry inspection and vaccine production, and the protection of our country against the importation of foreign animal species.

Excellent opportunities exist for veterinarians interested in research—both research for the direct benefit of animals and research conducted with animals but for the...
benefit of humans. Such opportunities are available at colleges and universities and with governmental agencies, private research institutions, and biological and pharmaceutical companies.

Facilities
Administrative offices of the College of Veterinary Medicine are located in Morgan Hall on the agricultural campus. The Department of Animal Science is housed in Brehm Animal Science Building, also on the agricultural campus, and the Department of Microbiology is located in Walters Life Science Building on “The Hill” of The University of Tennessee, Knoxville.

The Veterinary Medicine Building on the agricultural campus houses the departments of Environmental Practice, Rural Practice, Urban Practice, and Pathobiology. Additionally, the Veterinary Teaching Hospital, clinics, and the Agriculture/Veterinary Medicine Library are contained within this modern structure of 246,000 gross square feet.

The college has research facilities on Cherokee Farm adjacent to the UT Hospital. Satellite teaching-research facilities are located in Middle and West Tennessee.

Admission Requirements
Admission to the professional program of the College of Veterinary Medicine is limited to that number for which an education of high quality can be provided with the resources available to the college.

To qualify for admission, a candidate must have completed at least the following minimum pre-veterinary requirements:

**Subjects**
- **English, including speech**
- **Humanities**
- **Social Sciences**
- **Mathematics through introductory calculus**
- **Chemistry: general**
- **Organic**
- **Biochemistry**
- **Physics**
- **Biology or zoology**
- **Microbiology**
- **Animal science, including nutrition and genetics**

**Minimum Credits**

<table>
<thead>
<tr>
<th>Quarter Semester</th>
<th>8</th>
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<tbody>
<tr>
<td>English, including speech</td>
<td>12</td>
<td>8</td>
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<tr>
<td>Humanities</td>
<td>12</td>
<td>8</td>
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</tr>
<tr>
<td>Microbiology</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Animal science, including nutrition and genetics</td>
<td>13</td>
<td>9</td>
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</tbody>
</table>

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**Admission Procedure**

Admission of new students will be for the fall quarter each year. Applicants will be screened carefully by a faculty committee to determine those best qualified for admission within the college enrollment quota.

Applicants will be considered in the following order of priority: (1) residents of Tennessee; (2) residents of other states.

Forms and instructions for making application for admission may be obtained from:

- Director of Admissions
- 202 Student Services Building
- University of Tennessee
- Knoxville, Tennessee 37996-0200

Applications must be completed and mailed by January 15 each year. All pre-veterinary requirements must be completed by the end of the spring term of the year in which the student plans to enroll in the College of Veterinary Medicine.

**Course Load**

The professional curriculum of the College of Veterinary Medicine requires a specific number of hours each quarter. A student may enroll for fewer or more than that number only with the permission of the dean. Because of the sequential and highly integrated character of the professional curriculum, all courses in a given quarter are considered prerequisite to those in the succeeding quarter.

**Extramural Programs**

The opportunity to participate in off-campus learning experiences may be available for a limited number of students during the latter half of the final year of the professional curriculum. Selection of an extramural learning experience will require approval by the department concerned and the College of Veterinary Medicine Curriculum Committee. The extramural program identified by the student must represent a learning experience not available within The University of Tennessee, Knoxville.

**Professional Curriculum**

The professional curriculum in veterinary medicine is an 1 1/2-academic quarter, year-round program, including summers. The first year (three quarters) consists mostly of pre-clinical subjects such as anatomy, physiology, microbiology, parasontology, and general pathology. The second year (four quarters) includes the study of diseases, their causes, diagnosis, treatment, and prevention. The final calendar year is devoted to intensive training in the solving of animal disease problems, including extensive clinical experience in the teaching hospital. The curriculum also provides for education in the science and art of veterinary medicine and in a number of subjects, including animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

Only students officially enrolled in the professional veterinary curriculum may register for 8000-level courses.

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**FIRST YEAR**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Hours</th>
<th>Credit</th>
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<tbody>
<tr>
<td>Fall</td>
<td>Vet. Medicine 8510</td>
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<tr>
<td></td>
<td>Vet. Animal Science 8540</td>
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<td></td>
<td>Vet. Medicine 8530</td>
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<td>Vet. Microbiology 8101</td>
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<td>Vet. Animal Science 8240</td>
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**SECOND YEAR**

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<tr>
<th>Quarter</th>
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<td>Summer</td>
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<tr>
<td></td>
<td>Vet. Medicine 8362</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Vet. Medicine 8343</td>
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<td>Vet. Medicine 8352</td>
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<tr>
<td></td>
<td>Vet. Medicine 8320</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Vet. Medicine 8363</td>
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**THIRD YEAR**

<table>
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<th>Basic Sequence roughly equivalent to</th>
<th>Hours</th>
<th>Credit</th>
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<td>Summer and Fall</td>
<td>Core Block - 8 weeks</td>
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<tr>
<td></td>
<td>Environmental Practice 8600 - 2 weeks</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Radiology 8401 - 2 weeks</td>
<td>3</td>
<td>3</td>
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<tr>
<td></td>
<td>Special Services 8402 - 2 weeks</td>
<td>3</td>
<td>3</td>
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<tr>
<td></td>
<td>Rural Practice - 8 weeks</td>
<td>12-16</td>
<td>12-16</td>
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<tr>
<td></td>
<td>Urban Practice - 8 weeks</td>
<td>12-16</td>
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<tr>
<td></td>
<td>Seminars</td>
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</table>

**TOTAL:** 88 hours

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Advanced Sequence (roughly equivalent to Winter and Spring Quarters)
Core Block - 9 weeks.
Pathobiology 8750 - 2 weeks.
Radiology 8401-2 weeks.
Pharmacology 8450-2 weeks.
Rural Practice - 9 weeks.
Urban Practice - 9 weeks.

Third Year Credits 82
TOTAL: 232 hours

1From 2 to 20 credits of Advanced Sequence training may be waived for a limited number of deserving students with convincing proposals for special intramural or extramural study.

Graduate Program
The College also administers a graduate program involving all departments and leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have the opportunities in the graduate programs of other instructional units, including Animal Science (nutrition and physiology), Microbiology (bacteriology, virology and immunology), Ecology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program (see page 94). This program provides a wide spectrum of interdisciplinary training that prepares graduates to assume positions in biomedical environments and in teaching or research capacities involving humans or animals.

Departments of Instruction

Animal Science—Veterinary Medicine


Pharmacology

In addition, academic expertise of staff members at CARL and Oak Ridge is used on appropriate occasions.

PROFESSIONAL COURSES

8240-50 Veterinary Physiology (4.5) Introduction to concepts and problems in physiology which form a base for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Order of sequence: Cellular, cardiovascular, renal, respiratory, neural and endocrine physiology. 8240: 1 hr and demonstration, 8245: 4 hrs and 1 demonstration. F, W


8540-50 Veterinary Gross Anatomy (5.5) Lab covering gross and applied anatomy of common domestic animals (dog, cat, horse, cow). Dissection of embalmed specimens; prosections, slides, models, and living animals. Sequence of organ system study correlated with 8510-20. F, W

8570 Special Problems in Animal Science (2-20) Certain topics in anatomy, histology and physiology. May be repeated. W, Sp

8575 Advanced Seminar in Animal Science (1-4) Applied anatomy, histology and physiology. F, Su

GRADUATE COURSES

5530 Mammalian Organology (5) Microscopic study of structure of organs of major organ systems. Prereq: Zoology 3500 or equivalent. 3 hrs and 5 labs. W

5540 In vitro Evaluation of Toxicity (3) Principles and techniques of in vitro evaluation of acute toxicity, mutagenesis, carcinogenesis, and teratogenesis. Prereq: Biochemistry 5610. 2 hrs and 3 labs. W, Sp

Environmental Practice


PROFESSIONAL COURSES

8600 Basic Clinical Rotation in Environmental Practice (3) Introductory clinical experience in laboratory animal and zoo animal medicine, epidemiology, other related disciplines. F, Su

8611-12 Pharmacology (2,5) Principles of pharmacokinetics as well as pharmacodynamic properties of veterinary drugs: mode of action, pharmacokinetic effects, chemical and physical properties, metabolism, toxicology, important idiosyncrasies, clinical application. Correlated with 8620, 8625, and 8611 W, Sp

8660 Environmental Clerkships (2-20) Advanced clinical experience and training in practice of laboratory and zoo animal medicine. Prereq: 8660, Pathobiology 8700, Rural Practice 8000, and Urban Practice 8800. May be repeated. F, W, Sp

8670 Special Problems in Environmental Practice (2-16) Public health and epidemiology. May be repeated. W, Sp

8675 Advanced Seminar in Environmental Practice (1-4) Comparative medicine, public health, epidemiology, and pharmacology. F, Su

Graduate Courses

5000 Thesis (1-15) P/NP only. E

5010 Special Topics in Environmental Medicine (1-3) Aberrant metabolism, pharmacokinetic studies, toxicokinetic studies, epidemiology and techniques in molecular biology: atomic absorption, gas chromatography, ultracentrifugation, extractive techniques and radioimmunoassay. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5020 Experimental Animal Surgery (4) Competence in performing humane surgical modifications of experimental animals. Techniques of anesthesia. Drug administration and postoperative care. Prereq: Zoology 4650, 4410, 3080, and/or consent of instructor. Sp

5611-12 Pharmacology (2,5) Molecular basis of drug action; pharmacokinetic and pharmacodynamic principles; clinical and toxicological applications. Correlated with Animal Science 8240-50. Prereq: Consent of instructor and Dean, College of Veterinary Medicine. W, Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6010 Advanced Topics in Environmental Medicine (1-3) Current and future research methodology, laboratory situation, recent advances in instrumentation and analytical techniques for environmental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

Microbiology—Veterinary Medicine

Professors: A. Rosen, Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; R. J. Courney, Ph.D. Syracuse; T. C. Montie, Ph.D. Maryland; W. S. Ryker, Ph.D. Yale; T. T. Roress, B.V. University of Bristol (England); T. D. University of Guelph (Canada); J. M. Woodward (Emeritus), Ph.D. Kansas; J. C. West, Ph.D. Indiana.

Associate Professors: D. A. Benitis, Ph.D. Cornell; D. A. Brian, D.V.M., Ph.D. Michigan State; G. S. Sayler, Ph.D. Idaho.

Assistant Professors: R. M. Moore, Ph.D. Texas-Austin; K. M. Sirokin, Ph.D. Michigan State; G. Stacey, Ph.D. Texas-Austin.

PROFESSIONAL COURSES

8101 Veterinary Bacteriology and Mycology (5) Pathogenesis of bacterial and fungal diseases. Taxonomic study relating microbial structure, metabolism and genetics to patterns of disease and mode of action of antimicrobials. 3 hrs and 2 labs. F

8102 Veterinary Virology (4) Structure and replication of animal viruses, classification of viruses, mechanisms of viral pathogenesis. Techniques for quantitating viruses, viral antigens, and antiviral antibodies. Fundamental for understanding best approaches to viral diagnosis and immunoprophylaxis. 2 hrs and 2 labs. W

8103 Veterinary Immunology (4) Immunobiology, mechanisms of immunity, diagnostic immunology, role of immune response in preserving integrity of body as well as in causing disease. 2 hrs and 2 labs. W

8175 Advanced Seminar in Microbiology (1-4) Applied microbiology such as serologic diagnosis, clinical immunology, and genetics to patterns of disease and mode of action of antimicrobials. 3 hrs and 2 labs. F

Graduate Courses

For specific course listings please see
College of Agriculture, Department of Animal Science, and College of Liberal Arts, Department of Microbiology.

Pathobiology

6052 Pathogenesis and Diagnosis of Virus Diseases in Domestic Animals (5) Biology of viruses and pathology of virus infection in domestic animals. Prerequisite: Biochemistry 4110-20, 4119; Microbiology 4430, 4439; consent of instructor. W

6055 Techniques in Pathology (3) Fixation, processing and staining of tissue specimens; specialized gross dissection techniques; photography of gross and microscopic lesions. Prerequisite: Consent of instructor. 2 hrs and 1 lab. F, A

6060 Principles of Pathology (2) Advanced topics in pathobiology, such as mechanisms of disease pathophysiology, cellular degeneration, inflammation, immunopathology, hemostasis. Principal biochemical and morphologic responses of various cells, tissues, and organs to injury and other metabolic derangements. Participants present seminars on selected topics from current literature and textbooks. Prerequisite: Consent of instructor. F, A

Rural Practice

Professors:

Assistant Professors:

Graduate Students:

PROFESSIONAL COURSES

8701 Veterinary Pathology (5) Causes of disease, disturbances of cell growth, inflammation, and neoplasia. 3 hrs and 2 labs. Sp

8730 Veterinary Parasitology (4) Parasitology (protozoology, helminthology, and entomology) and relation to disease in animals. 3 hrs and 1 lab. Sp

8760 Advanced Pathology (3) Further training in clinical laboratory diagnostic procedures, and in postmortem examinations. W, Sp

8770 Special Problems in Pathobiology (2-10) Topic selected by design of research problem. May be repeated. W, Sp

8775 Advanced Seminar in Pathobiology (1-4) Diagnostic topics: cytology, electron microscopy, histologic techniques. Su, F

GRADUATE COURSES

5000 Thesis (1-15) P/Non-P only. E

5010 Comparative Pathology (5) Lectures and lab. Pathogenic mechanisms. Comparative aspects. Lectures reinforced by lab studying of gross, microscopic and ultrastructural lesions. Prerequisite: Zoology 3060, 3200. F, A

6000 Doctoral Research and Dissertation (3-15) P/Non-P only. E

6010 Special Topics in Pathology (1-3) E

6020 Special Problems in Pathobiology (1-5) Necropsy, histopathology, clinical research, ricketsiology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 20 hrs. E

6030 Veterinary Biopsy (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prerequisite: Consent of instructor. May be repeated. Maximum 4 hrs. E

6035 Correlative Post-Mortem Pathology (1-3) Gross and microscopic post-mortem examination of animals. Correlative interpretation of clinical diseases and lesions. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs. E

6040 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs. F

6045 Pathobiology Seminar (1) Subjects of current interest in biomedical science. Students present one seminar per term enrolled. Prerequisite: Consent of instructor. May be repeated. Maximum 2 hrs. Class meets once monthly. E

6050 Ultrastructural Pathology (1) Ultrastructural changes in diseased cells. Interpretation of observations. Prerequisite: Professional medical degree or consent of instructor. F, A

6051. 6060 Advanced Clinical Rotation in Rural Practice (12-16) Introductory clinical training in anesthesiology, hygiene, radiology, and surgery of companion animals. Su, F


8785 Advanced Seminar in Urban Practice (1-4) Neurology, cardiology, surgery, ophthalmology, Su, P

GRADUATE COURSES

5000 Thesis (1-15) P/Non-P only. E

6000 Doctoral Research and Dissertation (3-15) P/Non-P only. E

Interdepartmental Offerings

Veterinary Medicine

PROFESSIONAL COURSES

8010 Client Relations and Communication Skills (1) Intersessional skills as they apply to client relations and communication with colleagues, employees, general public. 1 lab. S/NC only. Sp

8310 Introduction to Veterinary Medical Practice (2) Animal species, breed identification, basic care, feeding, restraint, handling. Introduction to physical diagnosis, intravenous techniques, blood sampling, etc. 1 hr and 1 lab. F

8311 Introduction to Veterinary Medical Practice (2) Physical diagnosis, history taking, and client relations: anesthetic principles, agents, and techniques. 1 hr and 1 lab. Sp

8320 Medical Science Interaction Laboratory (3) Multidisciplinary lab, lectures and discussions to provide integrative learning and understanding of physiologic, pharmacologic and surgical concepts. Anesthetic and surgical principles and techniques, human care of animals, introduction to instruments used to measure physiologic processes and drug effects, use of physiologic recordings. Correlated with 8240, 8250, 8611, and 8612. 2 hrs and 1 lab. Su

8340 Integumentary System (4) Diseases of the integumentary system of animals, with emphasis on laboratory examination, interpretation of pathologic features, diagnosis, and treatment. 3 hrs and 1 lab. F

8341 Hematology and Introductory Clinical Pathology (2) Physiologic principles, blood testing, interpretation of test results, diagnostic and treatment of diseases related to clinical pathology and hemopoietic diseases. 3 hrs and 2 labs. F

8342 Alimentary Tract (9) Physiologic basis, pathology, diagnosis, and treatment of diseases of the alimentary tract and digestive organs. 8 hrs and 1 lab. F

8343 Patterns of Disease (5) Host-agent relationships. Pathology, laboratory diagnosis, control and public health significance, Principles of epidemiology and application in study of diseases in animal populations. Su

8344 The Art of Veterinary Medicine (1) Specific diagnostic problems or paramedical subjects important to veterinary medical practice: differential etiology, diagnosis, and treatment of certain disease signs or symptoms; implications for veterinarians of medical jurisprudence and ethics, practical economics, veterinary history. May be repeated. S/NC only. F, W, Sp

8350 Reproductive System (6) Diagnosis, therapy and prevention of diseases causing reduction of the reproductive efficiency of domestic animals. Abnormalities of the male and female reproductive systems, diagnosis and prevention of mastitis. 4 hrs and 2 labs. F
8351 Urinary System (4) Understanding of urinary-renal system of animals in health and disease. 3 hrs and 1 lab. W

8352 Cardiovascular System (3) Pathology, diagnosis, and management of cardiovascular diseases of animals. Anatomic, physiologic, and pharmacologic principles which provide basis for medical and surgical treatment. 2 hrs and 1 lab. Su

8353 Endocrine, Metabolic and Nutritional Diseases (4) Biochemical and pathophysiologic mechanisms of endocrine, metabolic and nutritional diseases of animals; diagnosis, therapy and prevention. F

8360 Musculoskeletal System I (5) Pathology, diagnosis, and treatment of muscular and skeletal diseases of small animals; pathologic changes, interpretation of radiographs and surgical procedures. 4 hrs and 1 lab. W

8361 Musculoskeletal System II (5) Pathology, diagnosis, prognosis, and management of musculoskeletal diseases of large animals. Functional anatomy, radiographic interpretation, surgical procedures and medical therapy applicable to equines and ruminants. 4 hrs and 1 lab. W

8362 Veterinary Toxicology (3) Molecular mechanisms and pathologic and clinical features of animal diseases caused by common toxic agents. Su

8363 Public Health (2) Public health aspects of veterinary medicine and nature of related laws, ordinances and regulations. Veterinarian's role in the protection of environment, ecology, and quantity and quality of food. Su

8364 Animal Dietetics (1) Applied nutrition of cattle, swine, horses, dogs and cats for the veterinarian. Diets and methods of feeding for both normal and special situations. Sp

8365 Radiology (4) Basic radiologic technology, radiation safety, special procedures and radiographic interpretation in diagnosis of clinical cases. 3 hrs and 1 lab. W

8366 Respiratory System (4) Detection and diagnosis of upper and lower respiratory diseases of domestic animals. Pathophysiology and pathology of infectious and noninfectious diseases. Lectures and lab with live and simulated case studies. 3 hrs and 1 lab. W

8370 Neurosciences (9) Normal and abnormal neural structure and function in animals; clinical neurology and neuropathology. 6 hrs and 3 labs. Sp

8371 Visual and Auditory Systems (3) Diseases involving eyes and ears of animals, with emphasis on anatomic, physiologic, and pathologic features. 2 hrs and 1 lab. Sp

8372 Comparative Medicine (4) Diagnosis, prevention, and treatment of diseases of laboratory animals, avian species, and marine mammals seen most commonly by practicing veterinarians. Sp

8375 Principles of Medicine (4) Physiologic and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases; recent scientific advances and effects on veterinary medicine. Sp

8401 Clinical Radiology (3) Training in radiographic techniques and in interpretation of radiographs as part of the diagnostic process. May be repeated. E

8402 Special Medical Services (3) Clinical training in specialty areas such as anesthesia and ophthalmology, with casework in both urban and rural animal clinics. Su, F

8460 Extramural Programs (2-20) Supervised off-campus educational program with an approved institution; limited enrollment. Prerequisite: Consent of department and College of Veterinary Medicine Curriculum Committee. W, Sp

GRADUATE COURSES

5343 Patterns of Disease (5) Host-agent relationships in disease of animals. Pathogenesis, laboratory diagnosis, control, and public health significance. Epidemiology and application in study of diseases in animal populations. Prerequisite: Consent of instructor and Director. Comparative and Experimental Medicine Graduate Program. Su

5362 Veterinary Toxicology (3) Pharmacologic basis and pathologic features of diseases of animals caused by common toxic chemicals: clinical manifestations, diagnosis, and treatment. Prerequisite: Consent of instructor and Director. Comparative and Experimental Medicine Graduate Program. Su

5363 Public Health (2) Public health aspects of veterinary medicine and nature of related laws, ordinances and regulations. Veterinarian's role in the protection of environment, ecology, and quantity and quality of food. Prerequisite: Consent of instructor and Director. Comparative and Experimental Medicine Graduate Program. Su

5372 Comparative Medicine (4) Diagnosis, prevention, and treatment of diseases of laboratory animals, avian species, and marine mammals, seen most commonly by practicing veterinarians. Prerequisite: Consent of instructor and Director. Comparative and Experimental Medicine Graduate Program. Sp

5375 Principles of Medicine (4) Physiologic and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases; recent advances in principles of veterinary medicine. Prerequisite: Consent of instructor and Director. Comparative and Experimental Medicine Graduate Program. Sp
Graduate Programs

The College of Business Administration offers programs leading to six advanced degrees: the Doctor of Business Administration, the Doctor of Philosophy with majors in Economics and in Management Science, the Master of Arts with a major in Economics, the Master of Science with a major in Statistics, the Master of Accountancy, and the Master of Business Administration.

Graduate programs of the College of Business Administration are designed to prepare men and women to assume positions in the increasingly complex world of business and industry, teaching and research, and government.

Viewing the business firm as operating in dynamic social, political, and economic environments which demand leaders capable of dealing with innovation and rapid change, the College places central importance on development of students' thought processes. Emphasis is focused on flexibility of mind, receptivity to new ideas and capacity to adapt one's reasoning powers. Our objective is to encourage the student to develop the ability to reason analytically and logically. Above all, we strive to instill the irrepressible desire to continue to learn and grow in knowledge throughout the student's life.

The MBA Program

The MBA program is designed for students with undergraduate degrees in the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture. A full-time student can complete the program in six academic quarters. Those with degrees in business earned at an institution accredited by the American Assembly of Collegiate Schools of Business (AACSB) should be able to complete the program in five quarters. Full-time students are expected to successfully complete 12 hours per quarter and part-time students 6 hours per quarter. Scheduling and sequencing of courses are done with this assumption in mind.

The complete MBA program with a concentration in management is offered by the regular graduate faculty of the College for part-time students on the Knoxville campus and at Oak Ridge.

The program consists of the MBA core (twelve to nineteen courses depending upon exemptions based on prior studies and/or proficiency examinations) and a concentration/electives block of eight courses. Each course is 3 quarter hours of graduate credit. Thus, the total program may consist of from 60 to 81 quarter hours.

Prerequisites. Upon matriculation, the student must have received a bachelor's degree from a regionally accredited institution. College level mathematics through at least one course in calculus is the only prerequisite requirement for entry into the program. Those electing the management science or statistics concentration must have completed two years of college level calculus. Those admitted to the accounting concentration should plan on up to two additional quarters for undergraduate prerequisite courses that are taken during the first year of the program. Although not required, completion of undergraduate courses in certain areas may qualify the student for exemption from some core courses. (See information under "Exemption from Core Courses" on page 37.)

MBA Core. The following courses are required in each student's program unless an exemption from one or more courses is granted as provided below under the heading "Exemption from Core Courses." All courses are 3 credit hours. The core courses are:

- Accounting 5010, 5020, 5030
- Business Administration 5310; Business Law 5010
- Economics 5010, 5020, 5030; Finance 5010, 5020; Management 5010, 5020; Management Science 5010;
- Marketing 5010, 5020; Mathematics 5052; Office Administration 5050; Statistics 5010, 5020.

1Accounting 5020 and 5030 are waived for students who complete the concentration in accounting.

2See notation under the heading "MBA Concentration" in the Management Science Program section (page 44).

3See notation under the heading "MBA Concentration" in the Statistics Department section (page 46).
Concentration and Electives. A concentration area(s) may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection must be made no later than completion of 27 hours of MBA program coursework. In some cases, selection of an area(s) early in the program is encouraged to facilitate proper course sequencing. Requests for changes in concentration area(s) must be submitted to the Office of Graduate Business Programs.

Among the 8 courses in the concentration/electives block, at least 4 but not more than 6 must be in one of the following concentration areas (for specific courses required in some concentration areas, see departmental sections on following pages): Accounting, Economics, Finance, Forest Industries Management, Management Science, Marketing, Statistics, Transportation and Logistics. The remaining elective courses (2 to 4) must be in fields outside the concentration area, normally selected from MBA courses offered in other colleges of the university. In some cases, the College, and may comprise a second concentration area of 4 courses. Up to 2 courses (6 hours) in this block may be taken outside the College of Business Administration. No more than 3 courses numbered below 5000 may be included in this 8-course block. Courses numbered below 4000 normally are not approved for the MBA program. Before beginning the concentration/electives part of the curriculum, the student must have his/her program approved by the Office of Graduate Business Programs.

Exemption from Core Courses. A student may be exempted from certain core courses on the basis of having recently completed equivalent undergraduate courses in these subjects with grades of B or higher at a regionally accredited institution. "Recently completed" means, for mathematics, completion of the last course or regular use of math tools within two to three years of matriculation, and for other areas within three to five years of matriculation. Courses in this category (and the approximate undergraduate equivalent work) are:

- Accounting 5010 (6 quarter hours, fundamentals of financial accounting)
- Business Law 5010 (6 quarter hours, the legal and social environment of business)
- Economics 5010 (9 quarter hours, principles of economics—macro and micro)
- Mathematics 5052 (12 quarter hours, including college algebra and calculus. See topics included in Mathematics 5051 and 5052)

In addition to the above, a graduate of an AACSB accredited undergraduate business program may request exemption from one or both of the core courses in the area of his/her undergraduate major field, provided at least 30 quarter hours (20 semester hours) of course work was completed in the major area no more than five years prior to matriculation, and a grade average of 3.0 or higher (on a 4.0 scale) was earned for all courses in the major. Students requesting exemption must petition the appropriate department head. A minimum of 60 quarter hours of graduate credits is required to earn the degree. If a student qualifies for exemption from a course in addition to those provided for in the two categories described above, whether by proficiency examination or otherwise, an additional course approved by the Office of Graduate Business Programs will be included in the student's curriculum for each such exempted course so as to meet the 60-hour minimum requirement.

Students holding degrees from foreign institutions normally may not be exempted from taking core courses.

Transfer Credits. Graduate level courses taken at other AACSB accredited institutions that otherwise conform to University policy (page 15) may be credited toward MBA degree requirements within the following limits:

- MBA Core: 6 hours
- Concentration Area: 3 hours (provided at least 12 hours of core courses at this institution are included in each concentration area)
- Elective Area: 3 hours

The maximum number of hours that may be transferred is 9 quarter hours.

Other Requirements. The Application for Admission to Candidacy (see page 19) must be approved by two faculty members in the student's area(s) of concentration and the Associate Dean for Graduate Programs in the College of Business Administration, signed by the department head, and submitted to the Graduate Office.

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area(s) and a B average or higher in the overall program. In lieu of passing a written comprehensive examination the student must satisfactorily demonstrate his/her ability to analyze and solve multi-functional problems of the administrative processes and policy determination and to integrate the concepts of the various disciplines embodied in the curriculum of the program. The student is tested in these areas in the courses of the MBA core, particularly in the capstone course, Business Administration 5310—Business Policy, as well as in work required in the concentration areas.

Application and Admission. Applications are accepted to begin the full-time program in the summer quarter for those who have an undergraduate degree in an area other than business and in the fall for students who hold an undergraduate business degree.

APPLICATION DEADLINES
Note: Students are admitted for Summer and Fall quarters only.

Application deadline for Summer Quarter Admission: April 1
Application deadline for Fall Quarter Admission: July 1

To obtain application materials, write or call:

Associate Dean
for Graduate Business Programs
College of Business Administration
The University of Tennessee
Knoxville, TN 37996-0570
Telephone: (615) 974-5033

There are no admissions for spring or winter quarters. To be considered at admission sessions, the applicant's file must be complete. A complete application includes the Graduate School application, transcripts of prior college work, the MBA program application, two applicant evaluations and the GMAT score report. The first two items should reach The Graduate School 10 days before the MBA application deadline to allow for internal processing. Other items should reach the Office of Graduate Business Programs by the deadline date.

To admission to the MBA program, consideration is given to (1) applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate studies, (2) scores on the GMAT and that test's Foreign Language (TOEFL) for those whose native language is not English, (3) work experience and other activities which demonstrate potential for leadership, and (4) recommendations from professors and work supervisors. The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade point averages or GMAT scores.

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 the Master of Business Administration degrees.

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 for approval to pursue the dual program anytime prior to, or after, matriculation in either college. Such approval will be granted, provided that dual program studies be started prior to entry into the last 28 semester hours required for the J.D. degree and the last 24 quarter 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 completing both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual program.

The College of Law will award up to 8 semester hours of credit toward the J.D. degree for acceptable performance in a maximum of 12 quarter hours of approved graduate level courses offered by the College of Business Administration. Three of the 12 quarter hours must be earned in Accounting 5030 or a more advanced accounting course.
If College of Law credit is given for such an accounting course, the student may not receive credit for College of Law course 8590—Legal Accounting.

The College of Business Administration will award a grade of Satisfactory for a Law School course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a Law School course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course.

### The DBA Program

The primary objective of the Doctor of Business Administration (DBA) degree is to prepare a select number of qualified students for careers in university-level teaching and research, and for responsible positions in business and government.

Students seeking a DBA degree must be recommended for acceptance by the College of Business Administration to The Graduate School. Actual admission is based on the applicant’s overall standing compared with other applicants and with the number of vacancies in each department. Applications for the fall quarter (and all supporting documents) should be received by the College of Business Administration not later than March 1. Late applications are considered only in special circumstances.

#### Program of Study

The DBA normally requires at least three years of intensive study and research beyond the MBA degree.

Typically, the first two years of a student’s program consist of coursework, writing and research. The third year usually focuses on completion of the dissertation research and writing. It is emphasized that the DBA program of study is specifically designed for full-time students.

Upon acceptance of a student by a particular department, the student is expected to remain in residence until the dissertation has been completed and all requirements are met for completion of the DBA degree.

Since the program focuses on the development of competent scholars, heavy emphasis is placed on teaching and research skills. As part of the doctoral program, each student is required to serve as a teaching assistant to an undergraduate business class, or as a research assistant to a senior faculty member. Typically, the College of Business Administration offers financial support for doctoral students during their tenure in the program.

The Tennant Business DBA program is highly flexible, offering a wide array of major and collateral options. Moreover, heavy emphasis is placed on individualized instruction and close student-faculty interaction. Instruction takes the form of regular classes, doctoral seminars, and independent study and research. Students are also encouraged to attend lectures and discussions by visiting scholars throughout the year.

There are five areas of concentration offered in the DBA program:

- **Accounting**
- **Finance**
- **Management**
- **Marketing**
- **Transportation and Logistics**

More detailed information concerning these specific areas is available by writing directly to each department chairperson.

#### Degree Requirements

Doctoral students must file a program of study that has been approved by the permanent doctoral advisory committee and the Associate Dean for Graduate Business Programs by the end of the second quarter of coursework after entry into the program. This committee is nominated by the department chairperson in a student’s intended area of concentration, subject to the Graduate Council’s policies and procedures. Following are specific degree requirements:

**A. Residence.** Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.

**B. Program Prerequisite Areas.** Students must complete appropriate courses at the graduate level, or other approved concentrations of coursework, in the following areas:

- **Accounting**
- **Behavioral Science**
- **Business Policy**
- **Calculus**
- **Computer Science**
- **Economics**
- **Finance**
- **Legal Environment**
- **Management**
- **Marketing**
- **Statistics**
- **Econometrics**

All work in the above areas is subject to approval by the temporary Doctoral Advisory Committee and the Associate Dean for Graduate Business Programs. Specific majors may have prerequisites not listed above.

**C. Economics.** Economics 5110-20 (or equivalent) is required, except that Management 5610-20 (or equivalent) may be substituted with prior approval.

**D. Research Methods.** A minimum of 15 quarter hours of graduate research methods must be completed. At least 4 quarter hours in statistics courses beyond Statistics 5050 are required. The remaining 9 quarter hours can be completed in additional statistics (not to include Statistics 5050) courses or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

**E. Major Area.** The major area of concentration is the focal point of the DBA program. Students are expected to master the literature and research techniques in their concentration area, and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 18 quarter hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work in the major field taken at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available major areas are: accounting, finance, management, marketing, and transportation/logistics.

**F. Collateral Area.** A minimum of 12 quarter hours of graduate coursework is required in an area outside, but complementary to, the major area. The student may choose the collateral area from one of the following: one of the five major business areas listed above, economics, statistics, or a related area in another school or college of the University.

#### Comprehensive Examinations

Comprehensive written examinations over the major and collateral areas are required of each person seeking candidacy for the DBA degree. The major area examination is administered in two sessions of approximately four hours each and the collateral area examination in one session of approximately four hours. Written examinations may be supplemented with oral examinations. For a doctoral student having a collateral area in the College of Law, the results of only an oral examination may be deemed acceptable.

Scheduling of comprehensive examinations is coordinated through the Office of Graduate Business Programs.

With the passing of either the major or collateral area examination, the other examination must be passed within the next 13 months. Comprehensive examinations are generally offered during the fall and spring terms.

**Admission to Candidacy.** Students may apply for admission to candidacy for the DBA degree after maintaining at least a "B" average in coursework, successful completion of comprehensive examinations and acceptance of a research proposal for the dissertation by the student’s doctoral committee.

Doctoral students are advised to give serious attention early in their program to the composition of their doctoral committee. In accordance with Graduate School policy, the student and the major professor identify a doctoral committee composed of at least four faculty members, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. When the doctoral committee has been formed, the temporary doctoral advisory committee ceases to exist.

Admission to candidacy must be approved at least two full quarters prior to the date the degree is conferred (admission in the fall quarter permits graduation in the following spring quarter). Advancement to candidacy must occur no later than four years after the student enters the program.

Application for admission to candidacy must include a listing of all coursework taken in each of the fields required for the degree (business functional areas, basic disciplines, concentration area and collateral area). Graduate courses accepted from other institutions must be included. Under "Other Requirements" the date of acceptance of the research proposal by the doctoral committee should be indicated. The application must be approved by the student’s doctoral committee.
Applicants for management science and either the GMAT or the Graduate Record 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 10-11), M. Acc., MBA and DBA applicants must submit additional information on 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 fully accredited by the American Assembly of Collegiate Schools of Business and is associated with other leading graduate schools of business as a member of the Graduate Management Admission Council.

Fellowships and Assistantships

Fellowships. Information concerning nonservice fellowships administered by The Graduate School as well as application blanks may be obtained from the Graduate Office. Information on College-administered fellowships is available from the Office of Graduate Business Programs in the College of Business Administration.

Assistantships. A limited number of teaching assistantships and assistantships that require from 10 to 20 hours of service per week are available through the departments of the College. Remuneration includes payment of fees and out-of-state tuition as well as monthly stipend. Awards are generally made on the basis of scholarship and performance on the admission test. Application forms may be obtained in any of the departments or from the office of the Associate Dean for Graduate Programs. Applications must be received by March 1 for consideration of assistantships and fellowships 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 economy 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 socioeconomic information and 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 socioeconomic 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 governmental organizations and private industry. The Center publishes the Tennessee Statistical Abstract and quarterly 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 variety of programs ranging from executive programs to management seminars and customized “in-company” programs. The four-week 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 increasingly 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.

TEDP is offered twice yearly, and enrollment is limited to 36 participants per session. The participants travel 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 of 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 operation in business and industry. The three-week Institute for Productivity Through Quality teaches the very successful statistical techniques that Dr. W. Edwards Deming taught the Japanese after World War II.

Departments of Instruction

Accounting and Business Law

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

Accounting

MAJOR

DEGREE

Accounting

M. Acc.

Professors:


Associate Professors:


Economic Research

The three-week Institute for Productivity Through Quality teaches the very successful statistical techniques that Dr. W. Edwards Deming taught the Japanese after World War II.

The center is a member of the Association for University Business and Economic Research.

The three-week Institute for Productivity Through Quality teaches the very successful statistical techniques that Dr. W. Edwards Deming taught the Japanese after World War II.
MBA Concentration: Accounting

Minimum Course Requirements for MBA Concentration: Accounting

5110, 5120, 5210, 5420, and two of the following: 5320, 5330, 5340.

All Master of Business Administration students electing a concentration other than Accounting are required to take a minimum of 6 quarter hours of graduate level accounting in addition to Accounting 5010 or its equivalent. In those instances where Accounting 5020 and/or 5030 would result in substantial duplication of accounting work previously taken, the student shall not be permitted to earn credit in the same course, but must select an equivalent number of graduate accounting hours in lieu thereof. Recommended courses include Accounting 5110, 5120, 5210, 5220, 5420, 5510, and 5640.

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 Financial Accounting (3) Introduction to accounting modeling of firm and financial information system. Not available to students with credit for 2110-20 or equivalent. F, Su.

520 Corporate Reporting Problems (3) Analysis of uses and limitations of financial accounting models of the enterprise. Focus on external and internal uses of general purpose financial reports. Prereq: 5010 or equivalent F, W.

5903 Managerial Accounting (3) Analysis of accounting models of firm as vehicle for planning and controlling activities. Attention to development of cost data appropriate to managerial decision making. Prereqs: 5010, W, Sp.

5110 Seminar in Accounting Theory (3) Evolution of accounting theory, concepts underlying financial reporting models, and authoritative accounting literature as each relates to measurement of profit performance and financial position. Prereq: Consent of department head. May not be taken by students with credit for 4990.

5120 Seminar in Advanced Auditing (3) Theory and practice of auditing, including development and current issues relating to current auditing practices. Prereq: 4120 or equivalent.

5130 Selected Topics—Current Accounting Practice (3) In-depth consideration of selected financial reporting topics of particular relevance to current accounting practice. Prereq: 5110.

5140 Selected Topics—Current Accounting Theory (3) Critical in-depth consideration of current issues in the financial accounting literature. Prereq: 5110.

5160 Graduate Internship in Accounting (3) Full-time resident professional employment for one academic quarter involving qualified job experience written report of responsibilities, and evaluation of student performance. Prereq: Consent of instructor.

5210 Seminar in Advanced Managerial Cost Accounting (3) Analysis of conceptual and current issues impacting on development and practice of managerial cost accounting. Cost allocation, planning, and control under conditions of uncertainty, and responsibility accounting concepts. Prereq: 4230 or consent of instructor.

5220 Budgetary Planning and Control Systems (3) Alternative approaches to organizing and planning control systems to meet organization's needs and objectives. Control systems and corporate structure, discretionary expense centers, profit centers, investment centers, transfer pricing, and control in for-profit organizations. Prereq: 3210 or 5030.

5310 Auditing Concepts (3) Concepts and theory of auditing, environment of internal and external auditing, nature of evidence, internal control evaluation, and reporting. Not intended for persons who have credit for auditing course. Prereq: 3130 Prereq or coreq: Statistics 4415 or equivalent.

5320 Advanced Auditing (3) Case-oriented, including audit of specific asset, liability, revenue and expense accounts. Emphasis on reporting, data processing, sampling, and internal auditing. Prereq: 4110 with C or better. (Available only to M.B.A. students who do not have credit for 4120.)

5330 Advanced Income Tax (3) Federal income taxation with emphasis on tax planning and research. Prereq: 3120 with C or higher; 3430 with C or higher. (Available only to M.B.A. students who do not have credit for 4430)

5340 Consolidations and Business Combinations (3) Theory and practice of accounting for interrelated business entities—domestic and foreign. Not intended for persons who have credit for a course with a similar content. Prereq: 3130.

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

5430 Tax Planning (3) Advanced study of income tax problems emphasizing alternatives available to minimize tax liability compatible with achieving taxpayer objectives. Prereq: 4430 or equivalent.

5440 Taxation of Estates and Gifts (3) Transfers at death, inter vivos transfers, life insurance, annuities and employee death benefits, marital and other deductions and exemptions, and estate and gift tax returns. Prereq: 4430. (Not available to students with credit for 4440.)

5450 Taxation of Partnerships and Partners (3) Formation, operation, termination, and liquidation and other special problems of partnerships. Prereq: 5420.

5460 Taxation of Corporations and Shareholders (3) Organization and structure, distributions, liquidations, reorganizations, and special problems including Subchapter S Corporations and Personal Holding Companies. Prereq: 5420.

5490 Tax Policy (3) Current policies explored through historical development and current status of various areas of taxation, including legislative and executive actions: directed research in selected topics within field of taxation. Prereq: 5430, 5450, 5460.

5510 Not-for-Profit Accounting (3) Theory and practice of accounting for not-for-profit organizations, control and performance reports, measures of output and accomplishment, and financial and performance auditing for nonprofit entities. Prereq: 8 hrs of accounting and consent of instructor.

5560 Seminar in Accounting Information Systems (3) Literature on accounting information systems and advanced systems analysis and design concepts incorporating informational needs of other functional areas of business and interfacing of these areas. Prereq: 4630 or equivalent.

5910-30 Accounting Seminar (1, 1, 1) Research and discussion of contemporary issues in practice of accounting. May be repeated. Admission by consent of department head. S/NC only.

5950 Seminar in Accounting Research (3) Integration of areas of financial, managerial, tax, and auditing, including directed problem-oriented research in selected topics. Prereq: 5110, 5120, 5210, 5420. (Not available to MBA students.)

5990 Individual Research in Accounting (3) Directed research in a topic of mutual interest to student and faculty member. Prereq: Consent of department head in quarter prior to anticipated enrollment. May be repeated. Maximum 6 hrs.
6000 Doctoral Research and Dissertation (3-15) P/NP only. E

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


5010 Legal and Social Environment of Business (3) Survey of legal and quasi-legal institutions with emphasis on those which have particular significance to business: basic legal tenets and principles that pertain to business management. Not available to students with credit for 4110-20 or equivalent. F. W. Su.

5130 Administrative Regulation of Business (3) Federal Register System and Administrative Procedure Act and their relationship to business. How a regulation is made and enforced. Other legal controls of administrative agencies. Not available to students with credit for 4130 or equivalent. Prereq.: 4120 or 5101 or consent of instructor. Business Administration

MAJOR DEGREES

Business Administration

MBA, DBA

5050 Data Processing in Business (3) Fundamentals of data processing, computer programming and applications, systems design. E.

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 coordinated; sizing up company situation, determining objectives, developing sound policies, organizing and administering personnel to reach company objectives, continuous administrative reappraisals. Enrollment priority given MBA students in last quarter of their program. Prereq: All MBA core courses. E.

5410 Business and Its Societal Environment (3) Analysis of current forces and changes in society and interrelation of plans and actions in business and environmental factors. Prereq: Consent of instructor.

5610 Seminar in Applied Business Analysis (3) Application of business concepts and analytical skills to problems of small businesses in community. Students work in teams under supervision of an appointing professor. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Business Education

See College of Education

Economics

MAJOR DEGREES

Economics

M.A., Ph.D.

Professors: W. E. Cole (Head), Ph.D. Texas; R. C. Bohn, Ph.D. Washington (St. Louis); R. L. Bowdy, Ph.D. Texas; S. L. Carroll, Ph.D. Harvard; H. S. Chang, Ph.D. Vanderbilt; D. R. Feinweil, Ph.D. McGill; C. B. Garrison, Ph.D. Kentucky; H. W. Herzig, Ph.D. Maryland; J. F. Holly (Emeritus), Ph.D. Clark; H. E. Jensen, Ph.D. Texas; F. Y. Lee, Ph.D. Michigan State; A. Mayhew, Ph.D. Texas; J. R. Moore, Ph.D. Cornell; W. C. Allehe, Ph.D. London School of Economics; P. D. Quattle, Ph.D. California (Berkeley); G. A. Spiva, Ph.D. Texas.

Associate Professors: D. P. Clark, Ph.D. Michigan State; W. F. Fox, Ph.D. Ohio State; E. Biero (Emeritus), Ph.D. Florida; K. E. Phillips, Ph.D. Washington (Seattle); A. M. Schottman, Ph.D. Washington (St. Louis).

Assistant Professors: R. A. Hoffer, Ph.D. North Carolina; J. W. Mayo, Ph.D. Washington (St. Louis); K. L. Murphy, Ph.D. Michigan State; H. Thuorn, Ph.D. Washington (St. Louis).

THE MASTER'S PROGRAM

The minimum requirements for a graduate major in Economics for the Master of Arts degree consist of the following: (1) Economics 5111-12 and 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 final written comprehensive examination.

The requirements for a graduate minor in Economics are as follows: Either (1) 5111-12 and 5121, or (2) 5111 and 5121-22, or (3) with the consent of the head of the economics department, an alternative sequence of 9 hours to meet unusual conditions.

THE DOCTORAL PROGRAM

Subject Area Requirements

1. Students will be required to complete requirements in core subject fields as indicated:
   a. Economic theory: by comprehensive examination or by completion of Economics 5111-12 and 5121-22 with a B average or higher, and successful completion of Economics 6111 and 6121.
   b. History of economics: 6 hours of economic history at the 5000 level or above.
   c. History of economics: Economics 5150 and 3 hours at the 6000 level.
   d. Mathematical and quantitative methods: Economics 5180, 5190, and 5510. The 5510 requirement may be waived for students completing Economics 6170, 6180 and 6190. Students must achieve a grade average of B or higher for all courses offered to fulfill requirements of subparagraphs b, c, and d, or as an alternative, may petition to satisfy any one or all of these three fields by some other means such as comprehensive examination.
   2. Students will be required to demonstrate their competence by comprehensive examination in three fields with the approval of the department chairman. At least two of which must be selected from the following: economic development; economics of centrally planned economies; economics of labor and human resources; industrial organization; international finance; regional and urban economics; and, as agreed to by the 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 comprehensive exam in question.

Course Requirements: Candidates for the Ph.D. degree in Economics will be required to complete a minimum of 78 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.

MBA Concentration: Economics. Minimum Course Requirements for MBA Concentration: As approved by the area MBA faculty advisor.

4000 Special Topics (3) Student generated course offered at convenience of department upon student initiative. Subject matter and contents determined by students and instructor with approval of the department. 5000 Thesis (1-15) P/NP only. E

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. Course work must be degree completed. May not be used toward degree requirements. May be repeated. S/N/C only. E. 5011-12 Problems in Lieu of Thesis (3, 3) S/N/C only.

5090 Workshop in Economics (3-6) Special topics in economic education. Not available for credit in any College of Business Administration degree program. Prereq: Consent of instructor. May be repeated. Maximum 5 hrs.

5910-20-30 Economics Seminar (1, 1, 1) Research in progress and discussion of selected topics. May be repeated. S/N/C only. E.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.

ECONOMIC THEORY

4110 Managerial Economics (3) Application of economic theory to business making emphasis on profit objectives, measurement and forecasting demand and costs, and capital budgeting. Prereq: 2510 or 20 or equivalent.

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 cycles, and policies that have been proposed to combat them. Prereq: 3120 or consent of instructor. S.

4150 History of Economic Thought (3) Development of economic thought, tools of analysis, and economics as a social science, together with an analysis of socioeconomic conditions which influenced this development. Period covered: 1776 through 1936. Prereq: 1 yr of principles of economics and consent of instructor. F.

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. Must be taken in sequence. Prereq: 3110 and college algebra, calculus, and analytic geometry or equivalent. E. 5010 Introduction to Economic Analysis (3) Analytical tools of macro- and microeconomics for students without prior training in economics. Price determined by enrollment; national income measurement and determination, and banking system. Not available to students with credit for 2510 or equivalent. F, Su.

5020 Managerial Economics (3) Application of economic concepts to business decision making. Analysis and interpretation of demand, cost analysis, price behavior, and optimizing techniques. Prereq: 5010 or equivalent. Prereq or coreq: Statistics 5020 or equivalent. F, S.


5119 Fundamentals of Microeconomics (3) Verbal arguments and geometric and algebraic techniques. Theory of consumer behavior and demand; theory of production and costs and short run theories of profit maximizing firm in both perfectly competitive and monopolistic environments; theory of derived demand and the role major is other than economics. Not available for students with credit for 5111. Prereq: 3110 or equivalent. F.

1 Alumni Distinguished Service Professor

College of Business Administration/Economics 41
5111-12 Microeconomic Theory I, II, (3, 3) Theory of consumer choice and demand; theory of the firm; firm behavior in imperfect markets; market structures; derived demand and factor pricing; introduction to welfare economics; capital theory. Should be taken in consecutive quarters. Prereq: 3110 or equivalent. F, W

5120 Fundamentals of Macroeconomics (3) Determination of levels of employment and prices for economy as a whole; relationships between interest rates, money and credit, price levels, output, productivity, and quantity of money, and aggregate saving, investment, and liquidity preference. For students whose major is other than economics. Not available for students with credit for 5121. Prereq: 3120 or equivalent. W

5121-22 Macroeconomic Theory I, II, (3, 3) Monetarist and income-expenditure approaches to questions of income and price level determination; applications to contemporary macroeconomic problems. Should be taken in consecutive quarters. Prereq: 3120 or equivalent. W, Sp

5150 History of Economic Thought (3) Development of economic ideas from mercantilists through Alfred Marshall; emphasis given to classical and neoclassical tradition.

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

5510 Quantitative Methods in Economic 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 equivalent. W

5520 Introduction to Econometrics (3) Statistical demand analysis, production and cost analysis, dis- tribution of income and wealth, models of growth and cyclical behavior, macroeconomic applications. Should not be taken by students who contemplate taking Econometrics 6170-80-90. Sp

5810 Financial Markets and Intermediaries (3) (Same as Finance 5810) W

5830 Commercial Banking (3) (Same as Finance 5830) F, Sp

6111 Advanced Microeconomic Theory (3) Consumer behavior, production, and exchange in partial and general equilibrium settings. Prereq: 4170, 4180, 5112, or equivalent. F

6121 Advanced Macroeconomic Theory (3) Theory and techniques of statistical testing of economic hypotheses and construction of economic models. Review of classical least squares regression, multiple regression, least squares square regression model, and approaches to simultaneous equation models with application to current economic research. Prereq: 5180-90 and 5510 or equivalent. F, W, Sp

ECONOMICS OF CENTRALLY PLANNED ECONOMIES

5310 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 in a centrally planned economy. May be repeated with consent of department. F

ECONOMICS OF LABOR AND HUMAN RESOURCES

4420 Economics of Human Resources (3) Analysis of current problems in human resource development and examination of policies aimed at their solution. Problems include unemployment, education policy, labor mobility, discrimination based on sex or ethnicity, or others. Prereq: 2520.


ECONOMIC POLICY

5120 Fundamentals of Macroeconomics (3) Determination of levels of employment and prices for economy as a whole; relationships between interest rates, money and credit, price levels, output, productivity, and quantity of money, and aggregate saving, investment, and liquidity preference. For students whose major is other than economics. Not available for students with credit for 5121. Prereq: 3120 or equivalent. W

5121-22 Macroeconomic Theory I, II, (3, 3) Monetarist and income-expenditure approaches to questions of income and price level determination; applications to contemporary macroeconomic problems. Should be taken in consecutive quarters. Prereq: 3120 or equivalent. W, Sp

5150 History of Economic Thought (3) Development of economic ideas from mercantilists through Alfred Marshall; emphasis given to classical and neoclassical tradition.

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

5510 Quantitative Methods in Economic 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 equivalent. W

5520 Introduction to Econometrics (3) Statistical demand analysis, production and cost analysis, dis- tribution of income and wealth, models of growth and cyclical behavior, macroeconomic applications. Should not be taken by students who contemplate taking Econometrics 6170-80-90. Sp

5810 Financial Markets and Intermediaries (3) (Same as Finance 5810) W

5830 Commercial Banking (3) (Same as Finance 5830) F, Sp

6111 Advanced Microeconomic Theory (3) Consumer behavior, production, and exchange in partial and general equilibrium settings. Prereq: 4170, 4180, 5112, or equivalent. F

6121 Advanced Macroeconomic Theory (3) Theory and techniques of statistical testing of economic hypotheses and construction of economic models. Review of classical least squares regression, multiple regression, least squares square regression model, and approaches to simultaneous equation models with application to current economic research. Prereq: 5180-90 and 5510 or equivalent. F, W, Sp

ECONOMICS OF CENTRALLY PLANNED ECONOMIES

5310 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 in a centrally planned economy. May be repeated with consent of department. F

ECONOMICS OF LABOR AND HUMAN RESOURCES

4420 Economics of Human Resources (3) Analysis of current problems in human resource development and examination of policies aimed at their solution. Problems include unemployment, education policy, labor mobility, discrimination based on sex or ethnicity, or others. Prereq: 2520.


5240 Investment Analysis (3) Principles and techniques for evaluation of investment desirability of marketable securities, with emphasis on common stocks and corporate bonds. Financial statement analysis, price-earnings ratios, and recent mathematical valuation models. Prereq: 5020 or consent of instructor.

5340 Portfolio Analysis and Management (3) Development of basic concepts and varied methodological approaches in selection, management, evaluation, and review of asset portfolios. Modern analytical and statistical techniques. Prereq: 5420 or consent of instructor.

5510 International Financial Management (3) Analysis of international financial aspects of the financial management of multi-national firm. Integration of relevant topics from corporate finance, international financial markets, international monetary theory, and management of foreign exchange risk. Prereq: 5020.

5610 Real Estate Finance (3) Valuation, financial analysis, and investment in income-producing property. Tax aspects of acquisition, operation and sale. Syndication and financing methods. Prereq: 5010 or consent of instructor.

5620 Economic Analysis of Housing and Urban Land Markets (3) Intra-metropolitan mobility, neighborhood transition and federal housing policy. Historical development of housing policy as influenced by empirical and theoretical economic literature to policy makers and entrepreneurs. Prereq: Economics 5602 or consent of instructor.

5630 Real Estate Investment Analysis (3) Application of contemporary appraisal and feasibility analysis to real estate investment and computer models for discounted cash flow and mortgage equity analysis. Prereq: 5010 or consent of instructor.

5810 Financial Markets and Intermediaries (3) Capital formation and allocation in the economy. Role of financial intermediaries and markets. Theory and structure of interest rates. Analysis of money and bond markets; study of international financial markets. Prereq or coreq: 5010. (Same as Economics 5610.)

5830 Commercial Banking (3) Analysis of management policies of financial institutions, including assets, liabilities and capital management. Description of legal, economic, and regulatory environment, and implications for management. Examination of bank structure and competition, and changing trends in the U.S. financial system. Prereq: 5010. Prereq or coreq: Economics 5830. (Same as Economics 5830.)

590 Research in Finance (3) Directed research on topic of mutual interest to the student and staff member. Prereq: 5020. May be repeated. Maximum 6 hrs.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E


6520 Advanced Seminar in Capital Markets (3) Recent developments in journal literature: informational asymmetry, capital market imperfections, and international financial dynamics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


Management

Professors:
H. D. Dewhurst (Head), Ph.D., Texas; R. W. Boling, Ph.D., Stanford; M. Gordon, Ph.D., California; A. H. Keally (Emeritus), MBA Pennsylvania; J. M. Larson, Ph.D., Penn State; W. K. Reed, Ph.D., Edinburgh; S. C. Vance (Emeritus), Ph.D., Pennsylvania; G. C. Phillips, Jr. (Emeritus), Ph.D., Tennessee; M. B. Wortman, Jr., Ph.D., Minnesota.

Associate Professors:
F. A. Chamblin (Emeritus), MBA Indiana; C. S. Fowler, Ph.D., Georgia; R. C. Maddox, Ph.D., Texas; C. W. Neel, Ph.D., Alabama; M. C. Rush, Ph.D., Akron.

Assistant Professors:
K. C. Gilbert, Ph.D., Tennessee; R. T. Ladd, Ph.D., Georgia; G. B. Roberts, Ph.D., Georgia State; J. E. A. Russell, Ph.D., Akron.

MBA Concentrations: Management, Forest Industries Management.

MBA Concentration: Management. Minimum Course Requirements for MBA Concentrations: Management—As approved by the area faculty advisor. Forest Industries Management—5110, 5130; Forestry 5260, 5270.

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during the semester in which a student wishes to graduate. P/NP only. E

5170-80-90. (Same as Psychology 5170-80-90.)

5110 Organization Theory I (3) Analysis and design of organization structure. F

5130 Managerial Planning and Control (3) Processes of management planning and controlling with emphasis on corporate strategies. Prereq: 5020. Accounting 5030, Finance 5020, Marketing 5020.


5150-90-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) Introduction to basic concepts and ideas required for graduate study in industrial and organizational psychology. Must be taken as a unit of each year. (Same as Psychology 5150-90-90.) F, W, Sp
5210 Personnel Management (3) Analysis and appraisal of the personnel function. F, A

5220 Wage and Salary Administration (3) Analysis of principles and practices of labor relations and collective bargaining. Fall only. Prereq: 5210. F

5230 Human Problems in Administration (3) Review and critique of research in industrial human relations. (Same as Psychology 5450.) Spring only. Prereq: 5210. E

5250-60 Industrial and Organizational Psychology (1-3, 1-3) Readings in industrial and organizational psychology. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade. E

5280 Independent Study, Project or Research in Management (1-3) Topic of mutual interest to student and faculty member. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade. E

5320 Management Problems in Industrial Research (3) Advanced problems in research and development in management. Spring only. E

5410-20-30 Production Management (3, 3, 3) Quantitative approach to solution of production management problems. Prereq: 5200 or consent of instructor. F

5610-20 Organizational Behavior (3, 3) Behavioral methodology and perspective, including review of empirical behavioral research in organizations. Must be taken in sequence. F, W

5620 Research Methods in Management (3) Methodological issues in management research. Review of experimental design, measurement problems, data sources and collection, and applications of statistical methods, followed by critique of student research proposals. Prereq: DBA student status or consent of instructor. S/NC only. Sp

5710-60-70 Seminar in Industrial and Organizational Management Science (2) An analysis of management science and management information systems. Spring, Fall, Winter. E, F

5810 Energy Management: Theory and Practice (3) Management of energy resources and energy policy. F

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6120 Advanced Organizational Theory (3) Analysis of functioning of complex organizations: structure, culture, and control. Fall only. E

6130 Seminar in Contemporary Management Issues (3) Contemporary management policy issues. May be repeated. F

6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) Advanced problems in organizational psychology. Areas include performance, executive development, growth and organization, roles and morale. (Same as Psychology 6250-60-70.) Fall only. E

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

6900 Field Work in Industrial and Organizational Psychology (1-15) Supervised practice. One credit hr for each 30 hrs of such practice. Maximum 15 credits. (22-665.) Fall only. E

Management Science

MAJOR

Management Science

DEGREE

Ph.D.

Professor: R. S. Garfinkek (Chairperson), Ph.D. Johns Hopkins.

Associate Professors: J. H. Ko, Ph.D. SP; J. E. Rosenthal, Ph.D. Georgia Institute of Technology.

Management Science Committee: Members of the Management Science faculty and in addition: J. S. Bradley, Mathematics; K. C. Gilbert, Management; E. Glustoff, Economics; B. A. Ratliff, Geography; R. Shrivastava, Finance; C. C. Thien, Statistics; G. M. Thompson, Computer Science.

MBA CONCENTRATIONS

For students whose MBA concentration area is Management Science, the MBA Core is revised as follows: substitute Management Science 5310 for 5010, Statistics 5110 for 5010, and with approval of student's advisor, substitute Statistics 5120 for 5020. The concentration area must include Management Science 5330 and 5340.

MASTER OF SCIENCE PROGRAM

See page 97 for details of the Master of Science program in Management Science.

THE DOCTORAL PROGRAM

The Ph.D. program in Management Science is designed to prepare students for research and teaching, and related teaching to the application of mathematical tools to complex decision making. Three primary objectives of the program are:

1) to provide, through management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses.

2) to provide sufficient advanced study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science. The candidate may choose from the business functional areas (accounting, finance, marketing, production management, and transportation and logistics) or other disciplines, (e.g., computer science, forestry, ecology, and public administration).

3) to develop in the student, through coursework in mathematics, statistics, and computer science, a high degree of mathematical maturity which will serve the graduate well throughout his life-long career, whether in management, research, or teaching.

Degree Requirements. General University requirements for the doctoral degree are stated on page 20.

Courses. The minimum of 72 quarter hours of course work taken for graduate credit (exclusive of thesis or dissertation) is required. The candidate must complete a minimum of 36 quarter hours at The University of Tennessee: Knoxville, at least 9 of which must be at the 6000 level. Entering students who have completed graduate studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program.

The program includes approximately 24 to 30 quarter hours of course work in the applied concentration area.

Qualifying Examinations. The student must demonstrate mastery of probability theory and statistical inference (Statistics 5110-20-30) by passing a written qualifying examination. Mastery of 18 to 21 quarter hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis (either Mathematics 4225, 4245, 4060 and 5655, or Mathematics 5655-65-75) and real analysis (Mathematics 4510-20-30). Other options may be approved. In exceptional circumstances the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

These requirements must be completed by the end of the first year of the program.

There is no foreign language requirement. Comprehensive 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 comprehensive 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 minimum 72 hours of course work, normally is completed in the third year of the program.

Prerequisites for Management Science Courses. The Master of Management Science Program is interdisciplinary and students in 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 course work does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

5000 Thesis (1-15) P/NP only. E

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. E

5010 Quantitative Analysis for Management Decisions (3) Assignment, transportation and general linear programming problems; decision theory, Markov chains and queuing models. Prereq: Mathematics 4225 or equivalent. Statistics 5105. May not be taken for credit by students who receive credit for 5310. W, Sp


5335 Mathematical Programming Computational Systems (2) Practical aspects of using state-of-the-art mathematical programming systems. Students will write compatible software and report writing software for specific applications. Sp

5340 Application of Management Science Methods (3) Application of methods from 5310-20-30 to large-scale management problems. 5330 may be taken concurrently. F

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

5910 Management Science Problems (1-6) Directed study on subject of mutual interest to student and staff member. E
Marketing and Transportation

D. J. Barnaby (Chairman), Ph.D. Purdue

Marketing


Associate Professors: E. R. Cadotte, Ph.D. Ohio State; R. L. Jenkins, Ph.D. Ohio State; R. A. Mundy, Ph.D. Pennsylvania State; R. C. Reizenstein, Ph.D. Cornell; R. L. Sipiro, Ph.D. Georgia.

Assistant Professors: R. W. Buff, Ph.D. Purdue; J. O. Rentz, Ph.D. Georgia.

MBA Concentration: Marketing.
DBA Concentration: Marketing.

Minimum Course Requirements for MBA Concentration: 5300, 5350, 5400, 5410.

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 be repeated. May not be used toward degree requirements. May be repeated. S/NC only.


5020 Marketing Strategy and Decision Making (3) Management of basic marketing functions. Integration of functional decisional areas into development of marketing strategy, both domestic and international. Prereq: 5010. Prereq or coreq: Economics 5020; Statistics 5020. Sp, Su, W.

5210 Sales Force Management (3) Basic communication theory affecting objectives and problems of sales force management. Recruitment, selection, training, motivation, evaluation, and control of sales force. Prereq: 5020. F.


5300 Marketing Research (3) Investigation and solution of problems; application of research methods to functional areas of marketing. Research concepts, methods, and techniques. Prereq: 5020; Statistics 5010. F.

5350 Buyer Behavior Analysis for Marketing (3) Buyer behavior patterns with emphasis on implications for marketing analysis and executive action. Marketing and behavioral sciences. Prereq: 5020. F.

5400 Analyzing Market Opportunity for Marketing Decisions (3) Basic determinants of opportunity within markets, framework for identifying and organizing information required to assess market opportunity. Approaches to analyzing buyers in markets, forecasting external demand, analyzing industry-channel/competitor service. Emphasis on applying market opportunity analysis results to marketing decisions. Prereq: 5020. W.

5410 Advanced Marketing Strategy (3) Components of marketing strategy including development of marketing mix. Consideration of alternative strategies. Coordination and control of marketing activities. Prereq: 5300 and 5350. W.

5450 International Marketing Management (3) Development and management of international marketing programs. Problems involved in marketing goods and services in foreign markets. Political, cultural, and economic conditions in different countries. Prereq: 5020.

5990 Research in Marketing (3) Directed research on subject of mutual interest to student and staff member. Prereq: 5020 and 5300. May be repeated. Maximum 6 hrs. E.

6000 Doctoral Research and Dissertation (3-15) P/NP only.

6050 Macro/Theoretical Foundations of Marketing (3) Development and history of marketing processes, Role of marketing theory in developing marketing discipline and in research process. Environment and foundations of marketing decision making. Prereq: Consent of instructor. A.

6100 Design and Measurement in Marketing Research (3) Advanced design and measurement of marketing research. Prereq: Consent of instructor. A.

Transportation and Logistics


Associate Professors: E. L. Coffette, Ph.D. Ohio State; J. H. Foggin, DBA Indiana.

DBA Concentration: Transportation and Logistics.
DBA Concentration: Transportation and Logistics.

Minimum Course Requirements for MBA Concentration: 18 credit hours required including 5010, 5110, 5130, 5220. Transportation 5010 is prerequisite to all other graduate courses in this area.

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 Survey of Transportation and Logistics (3) Intensive survey of logistical demands made by society and specific users on nation's transportation system, problems facing carriers and government. Sp.


5120 Management and the Pricing Problem (3) Critical analysis of application of economic theory and regulatory restraints to pricing of carrier services. Sp.

5130 Carrier Transportation Management (3) Analysis of major transportation modes and their managerial strategies. Consideration of how social, technical, legal, and regulatory restraints affect top level decision making. Application of general business, marketing, finance, and statistical decision processes to transportation decision making in uncertain environment. F.

5220 Logistics Systems Management (3) Development of policy for management of logistical systems. Emphasis on executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through a case approach and simulation game. Prereq: Management 5020. W.

5510 Urban Transportation Policy (3) Movement of people, goods and information in urbanized areas of the United States. Theoretical scaling considerations, applications of multidimensional scaling techniques, and conjoint analysis. Prereq: Consent of instructor. A.

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

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

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

6350 Current Topics in Marketing (3) Specific topics will vary with each course offering, but could include non-business marketing applications, macro-environmental issues, market segmentation, children's television advertising, international marketing issues, marketing channels, and related issues. Prereq: Consent of instructor. A.
with special emphasis on formulation of national, state and local policy. Emphasis on evolving new urban transportation concepts.

5810 International Transportation Policy (3) Comparative analysis of transport systems in other countries. Analysis of U.S. policy relative to international transportation.

5910 Advanced Law and Regulation (3) Legal rights and responsibilities of shippers and carriers. Analysis of decisions of regulatory commissions, courts, and principles of law arising from these decisions.

5990 Independent Study in Transportation/Logistics (3) Directed study in surface and air transportation, national transportation policy, transportation/logistics research developments, or subject of particular interest to student and faculty. May be repeated. Maximum 6 hrs. E

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110 Seminar in National Policy (3) Critical analysis of contemporary national transportation policy issues. Prereq: 5110. F

6210 Seminar in Transportation and Logistics Models (3) Analysis of contemporary models and methodologies in transportation and logistics research. Relative emphasis on topical coverage at discretion of instructor. Prereq: Management Science 5010; Statistics 5010 or equivalent.

6220 Research Methodology in Transportation and Logistics (3) Philosophy and design of research in transportation and logistics.

Statistics

MAJOR DEGREE

Statistics M.S.

Professors: D. L. Sylwester (Chairman), Ph.D. Stanford; D. S. Chambers (Emeritus), M.B.A. Texas.

R. A. McLean, Ph.D. Purdue; J. W. Philpot, Ph.D. Virginia Polytechnic Institute.

Associate Professors: H. A. Lasater, Ph.D. Rutgers; G. B. Ranney, Ph.D. North Carolina State; R. D. Sanders, Ph.D. Texas; M. S. Younger, Ph.D. Virginia Polytechnic Institute.

Assistant Professor: S. W. Ward, Ph.D. Virginia Polytechnic Institute.

THE MASTER'S PROGRAM

The Master of Science program in Statistics is designed to provide students with a basic foundation in theoretical and applied statistics for careers as consulting and practicing statisticians. A special industrial statistics concentration is available for students wishing to focus on industrial applications of statistics.

A candidate should possess an undergraduate degree with a background in calculus, but no restrictions are imposed regarding the undergraduate major.

The department offers both thesis and non-thesis options for work toward the degree. With Options I and II, two-thirds of the total hours in each program must be at or above the 5000 level.

Option I. The student must present a minimum of 48 quarter hours of approved coursework to include:

(1) a minimum of 27 hours in graduate statistics courses.

(2) a minimum of 9 hours in collateral work outside the department, and

(3) a minimum of 3 hours credit for a directed study project.

Option II. The student may be approved for a thesis option consisting of a minimum of 45 quarter hours to include:

(1) a minimum of 24 hours in graduate statistics courses, and

(2) 9 hours credit for master's thesis. Option I or II must be approved by the department.

An industrial statistics concentration is available within the framework of either option.

MBA CONCENTRATION

For students whose concentration area is Statistics, the MBA Core is revised to substitute Statistics 5110 for 5120. The concentration area must include 5120 and 5130. Normally, Statistics 5250-90-70 are also included which require 3450 as a prerequisite.

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.


4310 Regression Analysis I (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. F, W, Sp

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. E

5000 Thesis (1-15) P/NP only. E

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. E

5010 Probability and Statistical Inference I (3) Fundamentals of probability, discrete and continuous probability models, mathematical expectation, and inference concerning means. Prereq: Mathematics 5052 or equivalent and a computer programming course. May not be taken for credit by students who receive credit for 5110. F, W, Sp

5020 Statistical Methods I (3) Regression and correlation models, basic time series analysis and forecasting; inferences about one or more proportions, and tests for independence. Prereq: 5010. W, Sp


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

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

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

5250 Parametric and Nonparametric Statistics (3) Methods for inference about one or more populations, and measures of association. Prereq: 5450. F

5260 Applied Regression Analysis (3) Simple linear and multiple regression, polynomial models, use of dummy variables, variable selection procedures, and nonlinear least squares estimation. Prereq: Matrix algebra, 3450, and statistical computing experience. W

5270 Design of Experiments (3) One-way ANOVA, multiple range tests, equal and unequal variances, transformations, factorial experiments, completely randomized designs, split-plots, and nested designs. Prereq: 5260. Sp

5310 Statistical Techniques in Industrial Processes I (3) Control charts for attributes and variables, capability analysis, parametric and nonparametric tolerance intervals, tool wear, and problems of measurement. Prereq: 3450. W

5320 Statistical Techniques in Industrial Processes II (3) Special control chart techniques, transformations, statistical tolerancing, acceptance sampling, sequential analysis, and analysis of variability. Prereq: 5310. Sp

5350 Special Topics in Statistics (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

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. F, W

6070 Factor Analysis (3) Principal component analysis and principal factor analysis; estimates of communalities; methods of rotation; interpretation of factors; cluster analysis. Prereq: 5360. Sp

6250 Linear Models (3) Linear statistical models for analysis of variance with disproportionate and unequal subclass numbers using generalized inverses, concepts of estimability, and hypothesis testing. Prereq: Matrix algebra and either 4310 and Animal Science 5720, or 5270. W
Donald G. Hileman, Dean
Paul G. Ashdown, Assistant Dean for
Undergraduate Studies
Herbert H. Howard, Assistant Dean for
Graduate Studies and Research

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 M.S. program (professional track) is
accredited by the American Council on
Education for Journalism and Mass
Communication. The College is a member of
the American Association of Schools and
Departments of Journalism and the Broadcast
Education Association.

The doctoral program in Communications is
listed in the Academic Common Market of the
Southern Regional Education Board. Students
residing in Alabama, Georgia, Kentucky,
South Carolina, Virginia, and West Virginia
can normally qualify for in-state fee status by
applying to the Academic Common Market
coordinators in their state capitals.

MASTER 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 communications, 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.

Applicants must meet admission
requirements of The 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, core course
sequences begin only in the fall quarter.

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 6140,
  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.

- 24 hours of selected courses within the
  field of Communications will normally be required to add
  Communications 5130 to their core;

- 9 hours of thesis work (Communications
  5000), including 3 hours of thesis seminar;

- 9 hours of thesis work (Communications
  5000), including at least 3 hours of thesis seminar;

- at least 12 hours (9 in journalism) 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 Bachelor's
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.

Each student in the professional track M.S.
program is encouraged to engage in a
one-quarter professional internship in the field
of his/her choice.

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.

Doctoral Program in Communications

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. New students may be
admitted to the program at any time; however,
core courses begin only in the fall quarter.

The Master's degree is not required for
entry into or completion of the doctoral
program. Program planning, however, will

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. New students may be
admitted to the program at any time; however,
core courses begin only in the fall quarter.

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. Those holding Master's degrees should anticipate two or more years of full-time study for completion of the Ph.D. degree.

The following are 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 if 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; (e) a statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Ph.D. Admissions Committee are recommended and may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

The course requirements for the Ph.D. are:

1. Core: 57 hrs
   - Communications 5120, 5121, 5140, 5200, 5410, 5420, 5470, 6100, 6141, 6200, 6300, 6310, 6320, 6330, plus 6 additional hours of advanced research courses; Statistics 5050 and 5060; 6 graduate hours of education; 3 graduate hours of organizational behavior; Computer Science 4130 or equivalent.
   - 2. Primary Concentration: 21 hrs
      - (Advising) broadcasting, journalism, public relations, or speech communication
   - 3. Secondary Concentration: 18 hrs
      - (Outside the College of Communications or a second concentration in Communications)
   - 4. Dissertation: 18 hrs

Total: 132 hrs

Admission to candidacy must be attained at least three quarters prior to graduation and requires successful completion of a comprehensive examination. A diagnostic exam also must be taken about two quarters after entering the doctoral program. This exam covers Communications 6100, 5120-21, 5140, 6140, and one statistics course.

REQUIRED SCHOLASTIC AVERAGE

A student in the College of Communications whose graduate grade point average, not including graduate work taken on a pass/fail basis, is 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 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 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

Planned course offerings in the College of Communications for a full calendar year are published in the College newsletter the preceding November. This information is available from the Dean's Office, 302 Communications Building, 974-3031.

Communications

MAJOR DEGREES

Communications

M.S., Ph.D.

Professors:
- J. A. Crook, Ph.D. Iowa State; G. A. Everett, Ph.D. Iowa; A. D. Fletcher, Ph.D. Illinois; J. B. Haskins, Ph.D. Minnesota; D. G. Hileman, Ph.D. Illinois; D. W. Holt, Ph.D. Northwestern; H. H. Howard, Ph.D. Ohio; B. K. Lefler, Ph.D. Southern Illinois; D. D. Nimmo, Ph.D. Vanderbilt.

Associate Professors:

5000 Thesis (1-15) P/NP only. E

5100 Introduction to Graduate Studies (3) Scope and methods of advanced study in communications. Information sources, literature review methods, scholarly style, thesis and degree requirements and procedure, overview of traditional and behavioral research methods. Prerequisite: Communications 5140.

5120 Communications Research Design (3) Non-experimental, quasi-experimental, laboratory and field experimental designs. Universal research process: from idea/problem definition to reporting research results. Correlation vs. causation. Su, F

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

5140 Mass Communication Theory I (3) Critical appraisal of selected hypotheses and theoretical concepts in research literature of mass communications. Conceptualization of communication processes. Prerequisite: 5100 or 6100. Recommended prerequisite: 5120. F, W

5150 Seminar in Communications Issues (3) Contemporary topics in communications. Prerequisite: 5120 and 5140, or consent of instructor. May be repeated. Maximum 6 hrs.

5200 Seminar in Communications Education (3) Principles and historical perspectives of education for journalism, broadcasting, and advertising. Su

5410 Seminar in Communications Law (3) Legal limitations, privileges, and major issues affecting mass media: law of libel and invasion of privacy, development of obscenity law, free press and fair trial, contempt of court, federal regulation of broadcasting, advertising and public relations industries, copyright and access to information. F

5420 Seminar in Communications History (3) Major trends in media: development of major concepts and issues. Prerequisite: Survey course in communications history or consent of instructor. W

5470 Seminar in Media Economics and Management (3) Economics of ownership and finance, role of new technologies and marketing techniques; corporate personnel policy, budgeting and expansion. Prerequisite: 5130 or equivalent. Sp

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 (3-15) P/NP only. E

6100 Introduction to Doctoral Studies (1) Doctoral degree and dissertation requirements. Committee formation and program planning. Overview of research methods and informational sources. S/NC only. F

6140 Mass Communication Theory II (3) Application of theory to contemporary mass communication problems. Topical approach: literature reviews and analytical papers. Prerequisite: 5120, 5140, 6100. W

6141 Mass Communication Theory III (3) Continuation of 6140, detailed analysis of selected topics in theory and research. Tutorials, readings, reviews, reports, and papers in fields of interest. Prerequisite: 6140. Sp

6300 Seminar in Communication Topics (3) Identification, presentation and analysis of special issues and problems in communication. Organization and strategy in writing research proposals. Prerequisite: 5100, 5120, 5140. Recommended prerequisite: 5101 or consent of instructor.

6300 Survey Research Methods in Communications (3) Survey methods applied to opinion and communications media research problems. Sampling, sampling, questionnaire construction, data gathering (personal, mail, and telephone), data processing and interpretation. Attitude measurement and message pretesting applications. Prerequisite: 5120 or consent of instructor. W

6310 Experimental Research Methods in Communications (3) Experimental methods applied to communications research problems. Causal inferences from various research designs. Control, single, double, and multiple independent variables. Laboratory and field experiment situations. Prerequisite: 5120 or consent of instructor. W or coreq: Basic statistics.

6320 Seminar in Historical Research Methods in Communications (3) Materials and methods in historical, descriptive, and legal research in communication theory and behavior. Prerequisite: 5100, 5120. Recommended prerequisite: 5140, 6100. Su

6330 Content Analysis (3) Content analysis as a mass media research technique, conceptual foundations. Research design, categorization, sampling procedures, data gathering, and analysis.

Advertising

Professors:
- A. D. Fletcher, Ph.D. Illinois; J. B. Haskins, Ph.D. Minnesota; D. G. Hileman, Ph.D. Illinois.

Associate Professors:
- J. B. Dunlap, Ed.D. Iowa; D. Jackson, M.S. Tennessee; R. E. Taylor (Head), Ph.D. Illinois.

Assistant Professor:
- M. L. Kerr-Foxworth, Ph.D. Wisconsin.

3630 Advertising Copy and Layout (4) Ideas and their translation into persuasive words and pictures. Principles and techniques of copy and layout. Lec-

48 College of Communications/Communications
4000 Advanced Advertising Copy and Layout (4) Creative strategy and execution of advertisements for mass media. Problems in idea creation for advertisements. Lectures and labs. Prereq: 3630 with grade of "C" or better or consent of instructor. F, W, Sp

4360 Advertising Media (3) Media, markets, and audiences. Evaluation of media in relationship to communication of advertisements. Prereq: 3000 with grade of "C" or better or consent of instructor. E

4460 Cases and Problems (3) The case approach to the study of advertising problems. Analysis of campaigns and trends. Prereq: 3630, 3650 and 4360 with grade of "C" or better or consent of instructor. F, W, Sp

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: 3650, 4000 and 4360 with grade of "C" or better or consent of instructor. F, W, Sp

4970 Independent Study (3) May be repeated. Maximum 6 hrs.

5310 Current Issues in Advertising (3) Current socioeconomic, legal, 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. Consideration of creativity, media, management, and research. Extensive individual reading; preparation and delivery of papers. Prereq: Consent of instructor. W

5340 Advertising Management (3) Agency-client relations, media strategy, creative strategy, research, and relationship between advertising and marketing function. Prereq: 4360 and 3630 or consent of instructor. Sp

5540 Advanced Advertising Research (3) Nature, scope, and application of research including measurement of advertising, media audiences, and evaluation of messages. Prereq: 4480 or consent of instructor.

5970 Independent Study (3) E

Broadcasting

Professors: D. W. Hof (Head), Ph.D. Northwestern; H. H. Howard, Ph.D. Ohio.

Associate Professor: P. G. Ashdown, Ph.D. Bowling Green; J. G. Cape, Ph.D. Indiana; M. W. Singletary, Ph.D. Southern Illinois.

Assistant Professors: B. A. Moore, Ph.D. Ohio; R. A. Shilton, M.A. Tennessee.

Communications Specialist: J. H. Carr, M.S. Tennessee.

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

3650 Radio-Television Writing (3) Theory and technique of writing broadcasting scripts except news and dramas. Special events, interviews, music specials, radio documentaries, and promotion material. F, W

4010 Speech for Broadcasting (3) Fundamental broadcast conditions affecting the announcer: pronunciation and oral interpretation of general American speech; Spanish, Italian, German and French pronunciation. Prereq: Speech 2311. F, W

4020 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. E

4030 Television Production (3) Overview of elements of television production: cameras, sound, lighting, videotape recording, optics, and studio control centers. Presented with the layperson and professional broadcast student in mind. Prereq: 4020 or consent of instructor. Cannot be taken for graduate credit by communications majors. E

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

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 newsperson. Prereq: 3610 and 3670 or consent of instructor. 2 hrs and 1 lab. Sp

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

4680 Broadcast Sales Management (3) Problems and practices of television and radio sales, case studies in sales development, promotion, and other areas of sales management. Prereq: 2750 or consent of instructor. Sp

4970 Independent Study (3) May be repeated. Maximum 6 hrs.

5410 Educational Broadcasting (3) Summary, analysis, application, and evaluation of television and radio broadcasting for educational purposes. E

5510 Creative Projects (3) For students having specialized broadcasting interests or those who wish extended directed study in creative writing or production projects. May be repeated. E

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 community affairs, listener services, live views, and news special. Prereq: 3610 or consent of instructor. W

5620 Broadcast Law and Regulations (3) Sociopolitical control of broadcasting; effect of laws, regulations, and public pressures upon station policies. Emphasis on unique situation of broadcasting among media in terms of regulation. Prereq: Journalism 4410 or 5210 or consent of instructor. F

5630 Broadcast Documentary Writing (3) Role of documentation in broadcasting. Planning, writing, and critique of documentary programs. Sp

5560 Radio-Television Program Development (3) Planning basic program structures 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. Su, F

5970 Independent Study (3) E

School of Journalism

Professors: J. A. Crook (Director), Ph.D. Iowa State; G. A. Everett, Ph.D. Iowa; J. B. Hashkins, Ph.D. Minnesota, B. A. Moore, Ph.D. Southern Illinois; D. D. Nimmo, Ph.D. Vanderbilt.


Assistant Professors: M. L. Kemper, Ph.D. Wisconsin; D. L. Smith, M.A. San Francisco State

3120 Writing Feature Articles (3) Selection of topics and practice in writing feature articles for newspapers, magazines, and consumer publications. Prereq: 2220 or consent of instructor. E

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

3720 Advanced Public Relations (3) Preparation of communications materials to gain support from various publics; planning public relations programs. Prereq: 3710. E

3810 Specialized Publications (3) Editorial and design considerations for company publications and small magazines. Prereq: 2230 and 3310 or consent of instructor. W, Sp

3900 Journalism Research Methods (3) Use of social science research methods in journalism with emphasis on survey techniques; interpretation and communication of research findings to public. W, Sp

4130 Editorial Writing (3) Analysis of editorial policies, practices, pages. Writing of editorials and columns, with emphasis on study and use of rhetorical devices and logic.

4150 Issues in Journalism (3) Topics vary. May be repeated. Maximum 6 hrs.

4310 Reporting Public Affairs (3) Reporting news of public personalities, government, State, county and local coverage. Prereq: 2230 and senior standing. W, Sp

4410 Mass Media and Society (3) Roles and responsibilities of mass media in society. Critique of mass media performance. Media codes and controls on the media.

4420 Newspaper Management (3) Daily and weekly business operations. Developments in newspaper management.

4560 Investigative Reporting (3) Investigative and interpretive reporting of complex or specialized subjects to place news in perspective or to clarify situations. Emphasis on writing for publication. Prereq: 2220.

4710 Public Relations Cases (3) Case studies and application of public relations principles to problems in business and industry, government, institutions, trades and professions, solving problems and public relations situations. Prereq: 3720. F, Sp

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

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

4950 International Communications (3) Communication of news and opinion among nations 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.

4970 Independent Study (3) May be repeated. Maximum 6 hrs.

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

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. F

5510-30 Writing and Editing Projects (3, 3) Specialized writing or editing interests, such as agriculture, politics, labor, finance, science, for technical as well as general publications. Prereq: 2220 or 2220.
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)
Richard Wisniewski, Dean  
C. Glennon Rowell, Associate Dean for Instructional Programs  
Thomas W. George, Assistant Dean for Support Services  
Madge M. Phillips, Director, School of Health, Physical Education, and Recreation  
Charles M. Peccolo, Director, Bureau of Educational Research and Service

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 the major areas listed on page 6, and to the Doctor of Philosophy degree in Health Education. The Ph.D. program with a major in Education provides five options for study in the departments of Curriculum and Instruction, Educational Administration and Supervision, Educational and Counseling Psychology, Physical Education, and Vocational-Technical Education. The program requirements and the options and emphases are:

## The Program

<table>
<thead>
<tr>
<th>Research Area</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign or Computer Language</td>
<td>0-9 Hours</td>
</tr>
<tr>
<td>General Core Requirements Courses in history of education, philosophy of education</td>
<td>6 Hours (represented)</td>
</tr>
<tr>
<td>Courses in learning theory, curriculum theory, and administrative theory</td>
<td>9 Hours (represented)</td>
</tr>
<tr>
<td>Trans-college seminar—four consecutive quarters</td>
<td>4 Hours</td>
</tr>
<tr>
<td>Specialization: Major Option—A minimum of 24 hours normally selected from one or two emphases within the major option</td>
<td>24 Hours (Minimum)</td>
</tr>
<tr>
<td>Supporting Emphasis—A minimum of 12 hours selected from an emphasis other than those emphases selected in the major option. (May be selected from any one of the five options but not a combination of options.)</td>
<td>12 Hours (Minimum)</td>
</tr>
<tr>
<td>Cognate—A minimum of 9 hours selected from outside the College in addition to the designated research courses.</td>
<td>9 Hours</td>
</tr>
<tr>
<td>Dissertation</td>
<td>Minimum</td>
</tr>
<tr>
<td>Options and Emphases</td>
<td>36 Hours</td>
</tr>
</tbody>
</table>

### Options and Emphases

**Option I. Administrative Theory and Practice**  
The Administration of Higher Education  
Contemporary Economics and Educational Finance  
Educational Planning  
Facility Planning  
Maintenance of School Plants  
Organizational Theory  
Personnel Administration  
The Politics of Education  
The Principalship  
The Superintendence  
Supervision

**Option II. Theories of Curriculum Development and Foundations of Education**  
Anthropological, Historical, Philosophical, and Sociological Bases for Educational Planning and Curriculum  
Principles and Models for Planning, Developing, and Evaluating Educational Programs  
Research Design for Educational Programs

**Option III. Instructional Theory and Practice**  
Principles and Models for Instructional Improvement  
Subject Areas of Instruction and Practice: i.e., English, Foreign Languages, Mathematics, Science, Social Studies, etc.  
Elementary and Early Childhood Instruction and Practice  
Learning Media Services  
Physical Education Instruction and Practice  
Adapted Physical Education  
Vocational-Technical Fields of Instruction and Practice
Option IV. Theories and Practice of Educational and Personal Adjustment
Assessment (Educational, Vocational, Personality)
Behavioral Interventions
Career Development
Cognitive and Motor Learning
Consultation for the Helping Professions
Counseling Psychology
Diagnosis and Remediation of Cognitive and Motor Learning and Behavioral Problems
Educational Measurement and Research
Design
Ethnic and Sex Fairness in Counseling
Group Processes
Human Development
Learning Theory and Application
Psychological Interventions in School and Community Settings
Student Personnel Work
Training and Supervision of Counselors

Option V. Foundations of Human Movement
Factors Influencing the Learning of Motor Skills
Philosophical and Sociological Foundations of Sport and Physical Education
Physiological Factors Related to Fitness and Performance

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.

Departments of Instruction
Art and Music Education
C. H. Ball, Head

Art Education

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>DEGREE</th>
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</thead>
<tbody>
<tr>
<td>Art Education</td>
<td>M.S.</td>
</tr>
</tbody>
</table>

Professors:
J. W. Robertson, Ed.D. Columbia, (Area Coordinator); H. N. Hult, Ed.S. Peabody.
Associate Professor:
J. P. Watkins, M.S. Tennessee.

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:

- 1. Art Education 5310, 5320, and electives .................................. 18
- 2. 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:

- 1. Art Education 5210, 5310, 5320, and electives ........................... 21
- 2. 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 exams are conducted under 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.

4350-60-70 Problems in Art Teaching (3, 3, 3) Prereq: Consent of instructor. E
5000 Thesis (1-15) P/NP only. E
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. E
5210 Organization, Administration, and Supervision of Art in the School Program (3) W
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. F
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. Sp
5850-60-70 Problems in Art Education (3, 3, 3) Prereq: Consent of instructor. E

Music Education

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>DEGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music Education</td>
<td>M.S.</td>
</tr>
</tbody>
</table>

Professors:
Associate Professors:

The 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:
- Music Education 5210, 5220, 5230 and electives 18
- Music electives 9
- Professional education courses including Curriculum and Instruction 5710 9
- Music Education 5000 9

Total 45

Requirements for non-thesis option:
- 1. Course requirements:
  - Music Education 5210, 5240, 5250, 5710, one seminar, and electives numbered 5000 and above 27
  - Music electives at 3000, 4000, and 5000 levels (not to include required undergraduate curricula courses) 15
  - Professional education electives including Curriculum and Instruction 5610, Educational Counseling and Psychology 4760, and Educational Counseling and Psychology 5050, 5320, or other appropriate course 9

Total 51

2. Evaluation (in addition to routine examinations in courses):
  - Written comprehensive examination in major and minor fields.
  - A public recital in principal instrument, piano, or voice.
  - The student shall elect one of the evaluation procedures below (with approval of advisor and committee):
    - (1) Oral examinations in major and minor fields.
    - (2) A performance of an original musical composition(s) accepted by the committee as music suitable for school music performing groups.
    - (3) The student shall elect one of the following examinations:
      - Plan, rehearse, and conduct a full public performance of music by junior or senior high school music students.
      - A long-term project under the supervision of the student's committee.
      - A minimum of three faculty members—the advisor from music education, one member from music; one member from other appropriate course.

4441-42-43 Teaching Class Piano (1, 1, 1) For majors in music, music education, or elementary education. Prereq: Consent of instructor. F, W, Sp
4450 Music in Special Education (3) Techniques and materials for exceptional children. Prereq: 3110-20, Su
4460 Marching Band Techniques (3) Functions, organization, and direction of a school marching band. Prereq: Consent of instructor. Coreq: 3511. F, W

5000 Thesis (1-15) P/NP only. E
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. E
5150 Studies in Secondary School Music (3) Development of understandings regarding growth pat-
5840 Seminar (3) Music teaching in vocal, theoretic-
acal, historical, and appreciation area of the secondary
school curriculum. Survey of research, professional li-
terature and development of bibliography. Labora-
tory activities. Projects. Prereq: Admission to M.S.
program. Su, A

Continuing and Higher Education

MAJOR

DEGREE

Adult Education

M.S.

College Student Personnel

M.S.

Professors:

M. C. McInnis Jr. (Head), Ph.D., Florida State;
W. H. Coffield, Ph.D., Iowa; J. P. Goddard, Ed.D.;
Tennessee; K. O. McCullough, Ph.D., Florida State;
J. M. Peters, Ed.D., North Carolina State;
E. M. Ramer (Emeritus), Ed.D. Columbia.

School Psychology


The Master of Science degree in Adult
Education is offered for teachers,
administrators, counselors, and community
education specialists. The degree program has
both a thesis and non-thesis option requiring a
minimum of 45 hours, and a non-thesis option
requiring a minimum of 51 hours. For each
option, 9 hours must be completed in the
behavioral sciences.

The Master of Science degree in College
Student Personnel is designed for individuals
interested in entering the field of student
personnel administration in colleges and
universities and in community or junior
colleges. The program has both a thesis and
non-thesis option. A minimum of 60 hours,
which includes 9 hours of practicum experience,
is required in either option.

For further information write the Depart-
ment of Continuing and Higher Education.

5454-55-56 Student Leadership Workshops (1, 1,
1) Small group and individualized experiences to
develop knowledge and skills in leadership roles;
for resident assistants, student government leaders,
student activities, other student organizations. Pre-
req: Consent of instructor. S/NC only.

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise
degraded during any quarter when such a student
uses a full load of graduate hours or faculty time before
degree completion may not be used toward
degree requirements. May be repeated with con-
itement. S/NC only. E

5060 Adult Education: A General Survey (3) His-
torical development, philosophies of adult education
agencies, programs, current issues, and literature of
adult education. F, Sp

5110 Seminar in College Teaching (3) Effective
college teaching; testing and measurement; research
in college instruction; major problems and
issues in higher education. Required of candidates for
the MACT degree. S/NC only. Sp

5360-70-80 Problems in Continuing and Higher
Education (1-3, 1-3, 1-3) Independent study of
problems and special institutes. S/NC only. E

5410 Law and University Law—The Legal En-
vironment (3) Legal precedent affecting organiza-
tion, administration, and financing of public higher
education; history and development of law; taxation,
private support, relations, tort liability, ad-
misnistrative law, academic due process, and affirma-
tive action in employment. W

5420 College and University Law—Constitutional
Rights and Responsibilities of Students (3) Legal
precedent affecting student personnel services in public
higher education. Student discipline, housing
issues, organizations, activities, fees, tuition, and rel-
lated federal regulations.

5440 American Higher Education (3) Purposes,
functions, organizations, and programs. F, Sp

5450 Instruction in Higher Education (3) Prob-
lems, procedures, and techniques.

5460 Adult Development (3) Changes in character-
istics of the aging person and life span and implications
for adult education. F

5470 The Curriculum of Undergraduate Higher
Education (3) Background, content, and organiza-
tion of instructional programs. Trends and evaluation
procedures, including accreditation activities.

5510 Governance of Colleges and Universities (3)
Development, change, trends, process, and struc-
ture of collegiate governance. F

5550 Fiscal Problems in Higher Education (3)
Revenue sources and fiscal management in public
and private colleges and universities. Sp

5560 Program Planning in Continuing and Higher
Education (3) Theory and method for planning adult
education programs. W

5700 Case Studies in College Student Personnel (3)
Prereq: 5750 or consent of instructor.

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

5995-65-75 Practicum in Continuing and Higher
Education (1-1, 1-1, 1-1) Supervised practice in
selected areas of instruction or administration of
continuing or higher education programs. S/NC only.
E

5980 Seminar in Continuing and Higher
Education (1-1, 1-1, 1-1) Problems and issues con-
fronting professionals in fields of adult or higher
education. E

5990 Practicum in College Student Personnel (3)
Prereq: 5750, 5770, Educational Psychology 5560,
or consent of instructor. May be repeated with con-
ent of instructor. M.S. Only.

4590 Advanced Seminar in Program Planning (3)
Concepts and theories related to program planning
in continuing and higher education. Prereq: 5660 or
equivalent.

See also course listings under the
Departments of Curriculum and Instruction,
Educational Administration and Supervision,
and Educational and Counseling Psychology.

Curriculum and Instruction

MAJORS

DEGREES

Curriculum and Instruction

M.S.

Elementary Education

M.S.

English Education

M.S.

Foreign Language Education

M.S.

Mathematics Education

M.S.

Reading Education

M.S.

Science Education

M.S.

Social Science Education

M.S.

Education

Ph.D.
graduate programs are designed to improve scholarship and educational competence in a number of areas leading to the Master of Science degree, the specialist in Education degree, the Doctor of Education degree, and the Doctor of Philosophy in Education degree.

THE SPECIALIST PROGRAM
The Educational Specialist degree program with a major in Curriculum and Instruction encompasses concentrations in the following areas: curriculum, elementary education, English education, foreign language education, instructional media and technology, mathematics education, reading education, science education, and social science education. The non-thesis option requires the completion of 51 quarter hours of course work.

THE DOCTORAL PROGRAM
The Ed.D. program in Curriculum and Instruction may include emphasis upon the following majors: Curriculum, Elementary Education, English Education, Foreign Language Education, Instructional Media and Technology, Mathematics Education, Reading Education, Science Education, and Social Science Education. The non-thesis option requires the completion of 51 quarter hours of course work. For further information, write the Department of Curriculum and Instruction.

54 College of Education/Curriculum and Instruction


ASSOCIATE PROFESSORS:

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

THE SPECIALIST PROGRAM
The Educational Specialist degree program with a major in Curriculum and Instruction encompasses concentrations in the following areas: curriculum, elementary education, English education, foreign language education, instructional media and technology, mathematics education, science education, and social science education. The non-thesis program requires the completion of 51 quarter hours of course work.

THE DOCTORAL PROGRAM
The Ed.D. program in Curriculum and Instruction may include emphasis upon the following majors: Curriculum, Elementary Education, English Education, Foreign Language Education, Instructional Media and Technology, Mathematics Education, Reading Education, Science Education, and Social Science Education. The non-thesis option requires the completion of 51 quarter hours of course work. For further information, write the Department of Curriculum and Instruction.
528 Seminar in Teaching Elementary Science (3) Analysis of current curricular issues. Prereq: 5282 or 5283; at least one year teaching experience; or consent of instructor.

5290 Teaching of Mathematics in the Elementary School (3) Methods, materials, and develop- ment. Not available for credit to persons completing recent elementary mathematics course. Prereq: Consent of instructor.

5291 Program and Materials in Elementary School Language Arts (3) Programs and special instructional aids associated with language arts. Prereq: 3260 or equivalent, or consent of instructor.

5292 Seminar in Research and Theory in Teaching Mathematics in the Elementary School (3) Systematic study of research and theory and their application to teaching of mathematics. Prereq: 3350 or equivalent, consent of instructor, and 1 yr of teaching experience. Su.

5301 Developmental Reading in the Elementary and Middle School (3) Methods and materials, basic approaches, examination of reading skills, development of functional relationship with other curricu- lum areas. Not available for credit to persons with recent course in reading education. Prereq: Consent of instructor.

5302 Psychology of Reading (3) The reading act, relationship between learning theory and reading, role of reading in child's overall intellectual development, assessment in in-service graduate reading course or consent of instructor.

5303 Methods and Materials for Teaching Critical Reading (3) Instructional techniques, methods, and materials for development of higher level comprehension skills, concepts, and attitudes for creative (or productive) and critical (or evaluative) reading. Prereq: Course in reading education or consent of instructor.

5304 Programs and Materials for Reading In- struction (3) Examination, selection, and use of materials in reading program, distinguishing between approaches and materials for teaching reading. Prereq: Course in reading education or consent of instructor.

5305 Trends and Issues in Teaching Reading (3) Differentiation of issues and trends through analysis of past, present, and future programs, materials, and developments. Prereq: Graduate course in reading education or consent of instructor.

5306 Teaching Reading to the Linguistically Differently Abled Learner (3) Language characteristics and special reading problems pertaining to linguistically different learner. Prereq: Course in reading education or consent of instructor.

5307 Assessment and Corrective Teaching of Classroom Language (3) Classroom linguistics, methods and approaches to assessing and correcting language arts (other than reading) difficulties. Prereq. One gradu- ate course in elementary school language arts or consent of instructor.

5350 Curriculum Development and Evaluation (3) Examination of alternative approaches to improve current practice. Prereq: 5560 or consent of instructor.

5350 Curriculum Development at the Local Level (3-9) Systematic approach to planning and development of curriculum at local school or system level. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5365 Mathematics Laboratories in Elementary School (K-9) (3) For elementary school teachers and materials for laboratory. Prereq: Consent of instructor. Sp, Su.

5379 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials. A student who has completed 4280 may not enroll without consent of instructor. Prereq: Course in reading education or consent of instructor.

5380 Practicum in Diagnosis of Reading Prob- lems (3) Theoretical and practical applications of specific reading diagnostic instruments; testing of elementary and secondary school children. Prereq: Completing a case study reports, and conducting parent conferences. Prereq: Course in diagnosis and cor- rective reading or consent of instructor. May be repeated. Maximum 6 hrs.

5381 Practicum in Remediation of Reading Prob- lems (3) Application of principles of learning and teaching methodology in working with elementary and/or secondary school students on one-to-one or small group basis. Prereq: Course in diagnosis and correction of reading problems or consent of instruc- tor. May be repeated. Maximum 6 hrs.

5382 Developmental Reading Practicum (3) Diagnosing and teaching children having development- al and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or con- sent of instructor. May be repeated. Maximum 6 hrs.


5410 The High School Curriculum (3) Identification of problems associated with curriculum study, emphasis on Tennessee curriculum framework, assessment of trends, problems and solutions. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5510 Education in Cultural Perspective (3) Con- tribution of anthropological concepts (primarily con- cepts of culture) to understanding of education pro- cesses, problems, and solutions thought in our society and others. (Same as Anthropology 5510).

5511 Non-Western Education: Anthropological Approaches (3) (Same as Anthropology 5511.)

5570 The Junior High and Middle School Curricu- lum (3) Curriculum designs and appropriate patterns of instruction to middle grade students. Prereq: 5500 or 5520 or consent of instructor.

5580 Curriculum Planning and Development (3) Introduction to curriculum theory and basic princi- ples. Prereq: 5410 or 5270 or consent of instructor.

5610 Educational Statistics (3)

5620 Direction and Supervision of Student Teaching (3) Roles and responsibilities of cooperat- ing teachers and student teachers; objectives and policies of student teaching programs; elements of clinical supervision; overview of research.

5630 Individualization of Instruction (3) Practical experience in designing individualized activities and materials. Prereq: 5560 and 5509 or consent of in- structor.

5640 Newer Trends in Elementary Education (3) Trends in classroom procedures, equipment, and materials of instruction; problems involving improve- ment of instruction. W, Su.

5650 Curriculum Laboratory for Elementary Schools (3-6) Workshops and in-service programs to improve instruction of teachers. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5670 Curriculum for Early Childhood (K-3) (3) Sp, Su.

5680 Teacher-Parent-Community Relations (3) Development of techniques for effective relations be- tween teachers and elementary and/or secondary school students, parents, and the community. Prereq: Consent of instructor. Sp, Su.

5690 Design of Instructional Media (3) Design and application of instructional development model to ar- rive at solutions for instructional problems, develop- ment and design of a learning sequence or module, using appropriate media in actual learning setting. Prereq: 4750 or consent of instructor.

5691 Advanced Production of Audiovisual Soft- ware (3) Lettering, overhead projectuals, mount- ing-preserving, synthesizing, phototyping, non- phonographing, and preparing materials for production of classroom audiovisual software. Prereq: 5690 or consent of instructor, Library and Information Sci- ence 4750 or equivalent. (Same as Library and Information Science 5691.)

5692 Evaluation of Instructional Media (3) Evalu- ating and recycling media prototype to meet needs and objectives of learners. Prereq: 5691 or consent of instructor.

5693 Administering Instructional Media Programs (3) Duties, functions, and responsibilities of media professionals developing and administering media program in various organizational and learn- ing settings. Prereq: 5691, 5692, or consent of instructor.

5694 Utilization of Educational Television and Radio (3) Use of noncommercial educational TV and radio in schools and colleges. Prereq: Consent of instructor.

5695 Research in Instructional Media (3) Media research and its application toward improvement of instruction and learning. Prereq: Consent of in- structor.

5696 Practicum Experience in Instructional Media (3) Practicum experience in professional media role as identified by student in various organi- zational and learning settings. Prereq: Consent of instructor.

5697 Application of Instructional Media (3) Media theory and research, newer media and technology, application of media in instructional settings. Prereq: Consent of instructor.

5710 Techniques of Research in Education (3) Study and application.

5720 Observation and Analysis of Instruction (3) Classroom observation and analysis procedures; de- velopment of objective observation and analysis skills in examination of existing observation systems.

5790 Career Development: Workshop (1-6) (Same as Educational Psychology 5790).

5800 Seminar in Cooperative Curriculum Re- search (3) Action research procedures and their appli- cation to programs. E.


5820 Seminar in the Teaching of Mathematics (3) Current methods and materials for grades 7-12 for experienced teachers. Prereq: 1 year teaching ex- perience (mathematics grades 7-12) or consent of instructor. Sp.

5825 Teaching Mathematics in the Middle and Junior High School (3) Problems related to teaching mathematics in middle and junior high schools. Understanding structure of mathematical concepts, strategies, methods, and materials for teaching. Materials suitable for individualized in- struction, mathematical laboratories, and indepen- dent study. Opportunities for individual projects. Prereq: 3350 or 3751-52 or equivalent. Su.

5830 Seminar in Mathematics Education (3) Cur- rent curricular issues. Emphasis on individual student projects and investigation. W.

5835 Teaching Mathematics in the Senior High School (or Junio College) (3-6) Curri- curum and teaching problems. Methods of teaching "analysis" courses such as Algebra II, trigonometry, analytic geometry and calculus. Prereq: 3751-52 or equivalent. Su.

5841 Trends and Issues in Early Childhood (3) Historical background; trends, and issues as basis for evaluating current programs, materials and tech- niques of teaching. F, Sp.

5842 Applications of Theory in Early Childhood Education (K-3) (3) Principles and practices from several theoretical orientations for young children (K-3). Teaching solutions to instructional and evaluation methods. Prereq: Course in child development or child psychology at senior or graduate level.
senior high schools, community colleges. Prereq: Consent of instructor. W

5962 Studies in Energy Education (3) Major and alternative energy sources with applications for development of energy educational programs and materials. Prereq: 3 credit hours in science taught in schools including community colleges. Prereq: 5961 or consent of instructor.

5970 The Teaching of the Social Studies (3) Su

5980 Projects, Programs, and Materials in Social Studies (3) Projects and aids associated with each social science discipline. W

6000 Declarative Research and Dissertation (3-15) P/NP only. W

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

6020 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools. Prereq: 3270 and 3272 or equivalent, or consent of instructor.

5989 Field Experience (1-6) Application of curricular and instructional principles, methods, and materials in schools. Program prerequisites must be met, and consent of instructor required. May be repeated. Maximum 12 hrs. S/NC only.


5901 Linguistics and the Teacher of English (3) Analysis and application of linguistics in the classroom. Su

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

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

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

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. Su

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

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

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

5909 Instructional Theory and Design (3) Instructional process and relationship to curriculum and learning. Prereq: Consent of instructor.

5910-20-30 Problems in Lieu of Thesis (2, 3, 3) S/NC only

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 education theory and practice.

5960 The Teaching of Natural Science (3) Strategies, laboratory techniques, testing and evaluation, professional guidelines, content for middle, junior and senior high schools, community colleges. Prereq: Consent of instructor.

5961 Seminar in Science and Environmental Education (3) Recent developments in science education. Interrelationships of major environmental factors on science education for middle, junior and senior high schools. Prereq: 4550 or equivalent, or consent of instructor. May be repeated. Maximum 6 hrs. W

5964 Mathematics in Middle School (3) Behavioral characteristics of children in regard to mathematics, content materials and functional instructional settings, and teaching strategies for development of mathematical ideas. Prereq: 3350 or equivalent. Su

5985 Social Studies and Science in Early Childhood Education (K-3) (3) Integrative approaches to and substantive classification systems of content areas of social studies and science for early childhood years. Emphasis on selection of appropriate social studies and science content and approaches for the young child. Prereq: 3270 and 3272 or equivalent.

5986 Language Arts in Early Childhood Education (K-3) (3) Language development of young learner with emphasis on teaching methods, procedures, program and materials in early childhood language arts program. Prereq: 3260 or equivalent or consent of instructor.

5987 Introducing the Concept of Early Childhood Education to Parents (1) (1) Principals of early childhood education for x-ray of parents. E

5988 Early Childhood Education (K-3) (3) Emphasis on thorough understanding of early childhood education. Prereq: 3260 or equivalent. S

6001 Seminar in Curriculum and Instruction (3) Required three quarters. Prereq: Consent of instructor. S

6020 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools. Prereq: 3270 and 3272 or equivalent, or consent of instructor.

6032 Organization and Administration of Reading Programs (3) Synthesizing instructional and learning components of reading into classroom, school, and system programs. Prereq: 2 5000-level courses in reading education and in language arts or consent of instructor.

6036 Research and Teaching in Elementary Education (3) Research and theory in application to teaching of reading; research design as it applies to research investigations. Prereq: Two 5000-level courses in reading. W

6031 Seminar in Reading and Language Arts (3) Topics new to reading and language arts chosen by need and instructor(s). Prereq: 5000-level course in reading education and in language arts or consent of instructor. Su

6032 Organization and Administration of Reading Programs (3) Synthesizing instructional and learning components of reading into classroom, school, and system programs. Prereq: 2 5000-level courses (preferably 5379 and 5304) in reading education or consent of instructor.

6040 Seminar in Curriculum and Instruction (1) Required three quarters. Prereq: Consent of instructor. W

6080 Advanced Seminar in Elementary Education (3) Critical analysis of research as it applies to classroom practice. Prereq: 5710 or 5800, 12 hrs at graduate level; or consent of instructor. W

5990 Advanced Studies in Elementary Education (3) Critical analysis of research as it applies to classroom practice. Prereq: 5710 or 5800, 12 hrs at graduate level; or consent of instructor. W

5990 Advanced Studies in Philosophy of Education (3) Some selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.

6081 Phenomenology and Education (3) Theory and application of selective educational issues. Prereq: 2 courses in history or philosophy of education.

6090 Special Topics (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E

6091 Independent Study (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E

6092 Supervised Readings (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E

6150 Education as Social Policy (3) Education as instrument of national policy, topical problems faced by society in shaping educational programs. Prereq: Consent of instructor.

6210 Seminar in Elementary School Social Studies Research (1) Current research in elementary social studies, status of research in field, needed research-related research from other fields. Prereq: Undergraduate course and one graduate course in social studies, or equivalent. Su

6230 Programs for Curriculum Improvement (3) W

6240 Interpretation of Research in Curriculum and Instruction (3) Research studies and relationships to professional assignments. Prereq: 5800 or 5710 or equivalent.

6250 Seminar in History of Education (3) May be repeated with consent of instructor.

6282 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.

6350 The Professional Education of Teachers (3) Principles and practices of preschool preparation of teachers for American elementary and secondary schools; current and historical trends and issues, innovations and directions for future.

6400 The Dynamics of Educational Change (3) Interdisciplinary approach to change process in education. Prereq: Consent of instructor.

6500 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate level courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

6510 Advanced Studies in Elementary Language Arts (3) Critical research analysis of structures and design of educational language arts. Prereq: 2 graduate level courses in elementary school language arts or consent of instructor. Sp

6511 Advanced Studies in Educational Anthropology (3) Ethnographic techniques in teaching, content and instructional settings. Prereq: 2 courses in cultural anthropology, educational anthropology, or consent of instructor.

6610-20-30 Seminar in Dissertation Proposal Writing (2, 2, 2) Preparation and evaluation of dissertation proposals. Prereq: Completion of at least one research competency or consent of instructor. S/NC only.

6710 Advanced Educational Statistics (3)

6720 Interpretation of Data (3) Types of data in published materials in education; principles of sound interpretation.

6730 Evaluation in Curriculum Planning: Theory and Application (3) Trends, issues, and theoretical frameworks, implications for conducting evaluation studies in specific educational settings. Prereq: 5580 and 5350, or equivalent.

6731 Advanced Studies in Curriculum (3) Analysis of influential curriculum theories and approaches, planning and design of educational programs. Prereq: 5560 and 5350 or equivalent.

6830 Studies in Mathematics Education (3) Reading and study related to historical trends and issues in mathematics education as they apply to current and future trends. Prereq: 5830 or consent of instructor.

6850 Principles of Educational Leadership (3) Conflicting concepts, with application to major problems in instruction, supervision, and administration.

6899 Internship (1-6) 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/NC only.

6990 Advanced Studies in Secondary Science and Environmental Education (3) Programs, materials, and current research for middle, junior and senior high schools, community colleges. Prereq: 5960 or equivalent, consent of instructor.

*May not be used toward meeting 6200 requirements.
Education

MAJOR

DEGREE

Ph.D.

Education

6001 Trans-College Seminar (1) Minimum of four consecutive quarters required of all Ph.D. students. Prereq: Admission to Ph.D. program. May be repeated. May not be used to meet 6000 requirement. S/NC only.

Educational Administration and Supervision

MAJOR

DEGREES

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

Education

and Supervision

Education

and Supervision

Professors:


Associate Professors:

G. W. Harris, Jr., Ph.D. Michigan; P. M. Hussen, Ed.D. Stanford.

Programs are planned for (1) students preparing for administrative positions normally found in the educational structure of the state; (2) students preparing for the position of supervisor 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. (Specialist in Education) degree and which provides advanced preparation for applicants judged to be potentially competent school administrators.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 51.

5000 Thesis (1-15) P/NP only. E

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. E

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

5130 Introduction to Educational Administration (3) Tasks, functions, and processes of educational administration; organization and structure of educational programs and institutions. E

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) P/NP only. E

5220 Philosophy and Theory in Educational Administration (3) Philosophical and theoretical foundations of educational administration, programs, and institutions, within the framework of American culture. F, Sp, Su

5230 Seminar in the Behavioral Sciences in Educational Administration (3) Key behavioral science concepts, constructs, and their application in administration such as semantics, communication, leadership, change process, organizations and organizational behavior, motivation and morale, role theory. Sp, Su

5290 The Politics of Education (3) Special emphasis on leadership structures, operational beliefs, and communication of ideas with regard to community decisions concerning education. F, Sp, Su

5310 School Administration and Civil Rights Issues (3) Emphasis on leadership responsibilities and resolve problems stemming from civil rights legislation pertaining to race, sex, and the handicapped. A

5420 District Level Administration (3) Role of central administrative team, relationships, and responsibilities, behaviors, and competencies to develop an effective school organization.

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

5440 Introduction to Law, Finance, and Business Management at the Building Level (3) Orientation for beginning principals for basic foundations of the American legal system; how case law effects daily building level operations; building level methods of fiscal and logistical support measures. Sp, Su

5450 Organization of the School Program (3) For principals and supervisors: conceptual and technical skills in organizing school program including curriculum, instruction, student grouping, staff, schedules, and space. Sp, Su

5460 Personnel Administration: Local School (3) Planning personnel needs; job analysis; recruitment; selection; placement; orientation of new staff; fair employment practices and dismissal counseling. Administration for both professional and supporting staff. Sp, Su

5470 Introduction to School Facility Planning (3) For school administrators; facility planning; skills in building planning, use and evaluation. Sp, Su

5480 Instructional Supervision—Local School (3) Developing a concept of supervision; instructional help, support, and service for teachers; supervision of curriculum; staff development; and staff evaluation. F, Su

5500 Introduction to Educational Planning (3) Processes for improving decision-making function through both quantitative and qualitative planning techniques. Relating educational policy analysis to educational planning. W


5560 Research for Educational Administrators (3) Descriptive, experimental, and quasiexperimen- tal design, interpret data and critique research results. Interpretation for survey studies and school surveys. Su

5580 Seminar in Communication Skills for Edu- cational Administrators (3) Identification, development and use of interpersonal and group related communication skills. Sp, Su

5711 Problems in Educational Administration and Supervision: School Operation (3) May be repeated. E

5712 Problems in Educational Administration and Supervision: Higher Education (3) May be repeated. E

5713 Problems in Educational Administration and Supervision: State School Administration (3) May be repeated. E

5714 Problems in Educational Administration and Supervision: Preparation Programs (3) May be repeated. E

5715 Problems in Educational Administration and Supervision: Community Education (3) Independent study of administrative problems. May be repeated. E

5751 Problems in Educational Administration and Supervision: Theory (3) May be repeated. E

5752 Problems in Educational Administration and Supervision: Finance (3) May be repeated. E

5753 Problems in Educational Administration and Supervision: Transportation (3) May be repeated. E

5754 Problems in Educational Administration and Supervision: Business Management (3) May be repeated. E

5755 Problems in Educational Administration and Supervision: Personnel (3) May be repeated. E

5756 Problems in Educational Administration and Supervision: School Plant (3) May be repeated. E

5757 Problems in Educational Administration and Supervision: Organization and Structure (3) May be repeated. E

5758 Problems in Educational Administration and Supervision: School Law (3) May be repeated. E

5759 Problems in Educational Administration and Supervision: Supervision (3) May be repeated. E

5770 Maintenance of School Plants (3) Skills in operating school custodial and maintenance pro- grams. Sp

5719 Survey Research Methods (3) Overview of descriptive studies, data collection, analysis, and inter- pretation for survey studies and school surveys. Strategies for descriptive research in education. F, Su

5850-60-70 Independent Study in Educational Administration (3, 3, 3) Prereq: Consent of instruc- tor. E, Su

5900 Special Topics (3) May be repeated. E

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) S/NC only. E

5950 Elementary Administrators Seminar (3) For in-service training of elementary school administra- tors. Developments, problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently an elementary school administrator and consent of instructor. May be repeated. S/NC only. F

5960 Middle School Administrators Seminar (3) For in-service training of middle school administra- tors. Developments, problems, programs, and trends of middle schools and management skills of middle school administrators. Prereq: Presently a middle school administrator or consent of instructor. May be repeated. S/NC only. F

5970 Secondary Administrators Seminar (3) For in-service training of secondary school administra- tors. Developments, problems, programs, and trends of secondary schools and management skills of secondary school administrators. Prereq: Presently a secondary school administrator or consent of instructor. May be repeated. S/NC only. F

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6040 Seminar in Educational Administration and Supervision (1) Required three consecutive quar- ters. S/NC only. E

6100 Internship in Educational Administration (3) May be repeated at discretion of student's commit- tee. 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 repre- sentative. E

6110 Administrator Update (3) Current topics of concern to practicing school administrators, selected each quarter and presented by specialist. Prereq: Presently a school supervisor or administrator, or consent of instructor. May be repeated. S/NC only. E

6190 Administration in Higher Education (3) De- veloping conceptual understanding of administrative theory and practice in higher education. F, Su
6220 Programs for the Professional Preparation of Education Administrators and Supervisors (3) A
6340 Current Trends in School Law (3) Logical arrangement of case and statutory material for public school administration; current legal, educational, social, and economic development; current legal developments concerning the law and public education. W, Su
6380 Instructional Supervision—School District (3) Definition and analysis of instructional supervision at the school district level. Supervisory operations including goal development; curricular development; instructional support, help, and service for teachers and administrators; personnel development; program evaluation. W, Su
6420 School Board-Superintendency Relationships (3) The local unit of school administration, school district and its governing body, board of education or school board. Sp
6440 School Business Management (3) Emphasizes superintendency team concept; planning, procurement and utilization of fiscal resources. F, Su
6450 Grant and Contract Proposal Preparation (3) Grants and contracts processes in education. Basic concepts applicable to other special agencies. A
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 negotiations, human relations, staff development, and staff evaluation. F, Su
6480 Special Topics in School Personnel Administration (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. W, Su
6530 Futuristic Educational Planning Methods (3) Methods for describing alternative futures. A
6540 Contemporary Economics and Educational Finance (3) Contemporary educational finance policies and their influence on educational service and program, national economy, welfare of individuals, and welfare of the nation. F, Su
6550 State-Federal Relations in Education (3) Purposes and functions of federal/regional/state/local educational agencies, organizational control and political variables. Major education laws, rule and regulation-making process, grants and contracts and inter-level policy instruments. F, Su
6560 Legal Foundations of Public Education (3) Legal framework and theoretical concepts that impinge upon the operation of schools within present legal structure of the United States. A
6580 Seminar in Managing Conflict (3) Learning about and experiencing various forms of conflict. W, Su
6750-60-70 Independent Studies in Educational Administration and Supervision (3, 3, 3) Prereq: Consent of instructor. May be repeated. E
6900 Administration of Complex Educational Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational organizations. W, Su
6970 Advanced Study in School Facility Planning (3) In-depth experiences in development of educational specifications and techniques of leadership in creation of quality educational facilities. A
6990 Special Topics (3) May be repeated. E
6981 Specialized Seminar: School Operation (3) E
6982 Specialized Seminar: Higher Education (3) Current policy development, organizational relationships, and administrative issues in higher education. Sp
6983 Specialized Seminar: State School Administration (3) E within the above programs are offered in applied behavioral analysis, educational measurement and research, career development, human development, learning-teaching instructional theory and application, personality assessment, and sex-fair counseling and teaching.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 51. Appropriate courses taken in this department will satisfy requirements for certification as a school psychologist.

Write the department for information concerning the program requirements.

Application deadlines to Ed.D. (Ph.D.) are February 14 and April 11; Ed.S. and M.S. deadlines are October 15, February 14, April 1, and July 15.

4110 Psychology of Sex Role Development (3) Examination, from both a theoretical and research base, of factors which contribute to sex role development and definition in society and role of education in these changes. For student with minimal background in behavioral sciences. F, Sp, Su

4130 Mental Health (3) Studies and exploration of positive and negative aspects of mental health with a particular emphasis on the role of counseling and treatment. W

4320 Self-Management for Personal and Professional Development (3) Applications in career, social, emotional, and physical development. Theoretical and experiential activities. Prereq: Introductory course in psychology or consent of instructor. Letter grade: A, B, C. W, Sp

4350-60-70 Special Topics and Problems (1-6, 1-6, 1-6) May be repeated. S/N or letter grade.

4440 General Evaluation Procedures for Public Schools (3) Prereq: 3430 or equivalent. A

4640 Standardized Testing (3) Use and interpretation of standardized group instruments in assessment of intelligence, aptitude, achievement, vocational interests, and personality adjustment. F, W, Su

4650 The Construction of Classroom Tests (3) Concerned with teacher-made classroom tests; instructional objectives, principles of test construction, item analysis, evaluating a test's reliability and validity, interpretation of test scores, relationship between testing and grading. W, Su

4760 Advanced Child Study (3) Prereq: 3430 or 3610 or consent of instructor. F, Su

4800 Psychology of the Disadvantaged Child (3) Significant behavioral differences and causes; appropriate intervention approaches. E

4810 Psychoeducational Aspects of Appalachian People (3) Exploration of psychology of people of Appalachian region through examination of history, culture, and role of education. Sp


4890 Differential Psychology (3) Nature and sources of individual differences in behavioral characteristics, and differences between racial, ethnic, socioeconomic, sex, and other groups. A

5000 Thesis (1-15) P/NP only. E

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 completion is completed. May be used toward degree requirements. May be repeated. S/N only. E

5540 Guidance and Pupil Personnel Services in Education (3) (Same as Vocational-Technical Education 5400.) F, Su

6984 Specialized Seminar: Preparation Programs (3) E

6990 Specialized Doctoral Seminar in Politics of Education (3) Political theories and practices as they affect operation of public school system. Appropriate theoretical discussions to develop understanding and appreciation of literature and research from education, sociology, and political science. One field inquiry. Prereq: 5290, 5810 or equivalent or consent of instructor. W

6991 Specialized Seminar: Theory (3) E

6992 Specialized Seminar: Finance (3) E

6994 Specialized Seminar: Business Management (3) E

6995 Specialized Seminar: Personnel (3) E

6996 Specialized Seminar: School Plant (3) Theory and practice in planning and operating educational facilities: related research in education and other disciplines; implications for further research; application of existing knowledge to known school facility settings. Prereq: Consent of instructor. A

6997 Specialized Seminar in Organization and Structure (3) Organizational theories in education including systematic review of status of organizational and leadership research in education and related disciplines; implications for further research; application of existing theory and research to known educational settings. Prereq: Consent of instructor. A

6998 Specialized Seminar: School Law (3) E

6999 Specialized Seminar: Supervision (3) A

Educational and Counseling Psychology

MAJORS DEGREES
Guidance M.S.
Educational Psychology M.S., Ed.D
Educational and Guidance Ed.S
Education Ph.D.

Professors:

Associate Professors:

Assistant Professors:

Graduate programs (thesis or non-thesis option) lead to the Master of Science degree with a major in Educational Psychology with concentration areas in educational psychology, school psychology, and in community agency counseling; the M.S. degree in Guidance has concentrations in elementary or secondary guidance; the Specialist in Education and the Doctor of Education degrees have concentrations in educational psychology, school psychology, counselor education. Professional emphases

1Part-time. 
2Adjunct.
5050 Children and Adolescents (3) Mental, social, physical, and emotional growth and development of children and adolescents; prevention, identification, and remediation of learning problems. W, Su
5060 Group Approaches with Students (3) Knowledge and skills appropriate to functioning with groups in counseling; psychological and parent education. F, W, Su
5070 Seminar in Elementary School Guidance (3) Trends, roles, functioning, and administration of guidance in elementary school. Sp, Su
5090 Field Work (1-6) Practical experience in departmentally approved field placement. Supervision by field and university personnel. Program prerequisites to field work must be met. May be repeated. Maximum 6 hrs. S/NC only.
5100 Developmental Psychology (3) (Same as Psychology 5100.) F, W
5101 Advanced Psychology of Adolescence (3) Theory and research on principles and problems of adolescent development; application to individual adolescents. Prereq: 3810 or equivalent. A
5110 Psychology of Women (3) Past and current educational and psychological theory and practice with special attention to assumptions, functions, and practice in regard to women; special context in which various theories were developed and current theories and research focusing on women and/or sex differences. Prereq: 4130 or basic course in personality theory. W
5111 Seminar in Current Issues in School Psychology (3) (Same as Psychology 5111.) S/NC only.
5120 Seminar in Bias-Free Counseling (3) Feminist psychology, bias-free education, and counseling. Prereq: 4110 and 5110 or consent of instructor. May be repeated. Maximum 9 hrs.
5140-50-60 Psychoeducational Assessment (3, 3, 6) (Same as Psychology 5140-50-60.) W, Sp, Su
5149-59-69 Practicum in School Psychology I (2, 2, 2) (Same as Psychology 5149-59-69.) S/NC only. W, Sp, Su
5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) P/NF only. E
5210 Interpreting Published Articles; Statistics (3) Descriptive and experimental research in educational psychology, guidance and counseling, and college student personnel. Prereq: Non-thesis option students only or consent of instructor. F, W, Su
5220 Interpreting Published Articles; Research Design (3) For students not conducting research projects; interpret and evaluate statistical tables and statistical tests as reported in journals. Prereq: 5210 or consent of instructor. W, Sp, Su
5310 Diagnostic and Corrective Teaching (3) Application of psychology of learning to instruction and problem-solving situations that student encounters in classroom. Prereq: Course in general psychology. May be taken for undergraduate credit by under graduates admitted to teacher education or consent of instructor. F, Su
5319 Field Work in School Psychology: Level I (2) (Same as Psychology 5319.) S/NC only.
5320 Advanced Classroom Behavior Modification (3) Current research in psychology and its application to educational problems. E
5330 Theory and Research in Human Learning (3) Contemporary learning theory; current research and its influence upon school practice. F, Sp, Su
5331 Current Developments in Human Learning (3) Su.
5340 Group Dynamics (3) Principles of group dynamics as they apply to a variety of group settings. Group counseling, personal growth, and group leadership skills. (Same as Psychology 5340.) E
5350 Educational Applications of Cognitive Theories (3) Developmental theory of Jean Piaget and implications for education. Related theories such as Bruner and Ausubel. A
5360 Parent Consultation (3) Theory and practice of parent consultation on problems of school and home. Prereq: 5310, or 5320, or consent of instructor.
5560 The College Student (3) Nature, characteristics, and needs: W
5720 Evaluation in Education (3) Techniques and instruments for identifying and appraising social values, the thinking processes, social adjustment, emotional needs, personal interests, and problems. A
5780 Career Development: Theory and Research (3) F, Su
5785 Career Development: Program Development Implementation and Evaluation (3) Career development and pre-vocational programs and projects. K-adult with emphasis on development, implementation, and use of program and training related to career development. May be repeated. Maximum 6 hrs. (Same as Curriculum and Instruction 5780 and Social Education 5789.)
5840 Student Appraisal (3) Gathering, interpreting, and using psychological, social, emotional, and community information in the guidance program, sources, types of materials, and occupational filing plans. For use both in group and individual guidance programs. W, Su
5885 Career Development: Field Experience (1-3) Application of career development principles and practices in school, community, business, and/or industry. May be taken concurrently or separately. 5780, 5785, 5790, 5880, and/or consent of instructor. May be repeated. Maximum 6 hrs. E
5890 Counseling Theories and Techniques (3) Presentation, demonstration, and application. Open to students interested in counseling profession. (Same as Psychology 5890.) F, W, Su
5897 Prerecru and Practicum (3) Didactic experiences and counseling simulations in learning laboratory. Coreq: 5890. F, W, Su
5910-20-30 Problems in Lie of Thesis (3, 3, 3) S/NC only.
5940 Counseling Practicum (3) Supervised practice in counseling in elementary or secondary school guidance and/or student personnel work. Prereq: 4640, 5060 (or 5340), 5890, 5897 or consent of instructor. May be repeated with consent of department. Maximum 6 hrs. E
5950-60-70 Theory and Practice of Consultation (3, 3) (Same as Psychology 5950-60.) E
5959-5969 Practicum in Consultation (2, 2) (Same as Psychology 5959-69.) S/NC only.
6000 Doctoral Research and Dissertation (3-15) P/NF only. E
6040 Seminar (1) Required in fall quarter. Maximum 6 hrs. S/NC only. F
6099 Internship (1-6) Supervised employment at departmentally-approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E
6110 Application of Research Design (3) Research design and statistical analysis unique to educational psychology, counseling, and college student personnel. Emphasis on designs "experimental" in nature. May be taken for credit or audit: 2 courses in statistics or consent of instructor. F
6120 Application of Experimental Research Design (3) Experimental designs used by researchers in educational psychology, counseling, and college student personnel. Prereq: 6110 or equivalent. W
6319 Field Work in School Psychology: Level II (3) (Same as Psychology 6319.) S/NC only.
6510-59-60 Theory and Practice of Consultation (3, 3, 3) Supervised practicum with children and/or adults. Prereq: 5340, 5890, 5897, and 5940 and consent of instructor. May be repeated with consent of department. Maximum 6 hrs. W
6521-22-23 Practicum in Guidance Counselling (3, 3, 3) Supervised practicum in college guidance and personnel practice. Minimum: 30 clock hours each quarter. Prereq: 5890 and consent of instructor. May be repeated with consent of department. Maximum 6 hrs. W
6550-67-70 Seminar in College Student Personnel (2, 2) Issues in college student personnel, college counseling, student development, etc. Prereq: Consent of instructor, admission to the doctoral program. F, Sp, Su
6750-70-70 Special Topics and Problems (1-6, 1-6, 1-6) Not to be taken to fulfill regular 6000-level course requirements. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. May be taken for letter grade or S/NC. E
6810 Seminar in Counselling (3) Selected counseling theory, topics, issues. Prereq: 5890 or consent of instructor. May be repeated. F, W, Sp
6840-50-60 Seminar in Professional Issues (1, 1, 1) Job selection, convention participation, publishing, writing grant proposals, consulting, etc. For final year doctoral students only. S/NC only. F, Sp, Su
6910 Special Topics Seminar (3) Exploration of specific research or theoretical topics with students who have necessary background. Topic varies from quarter to quarter, depending upon instructor. Prereq: Advanced standing as doctoral student. May be repeated. S/NC only. W, Sp
6931-32-33 Practicum in Guidance Counselling (3, 3, 3) Supervised practicum in college counseling and personnel practice. Minimum: 30 clock hours in application of guidance tools and techniques. Minimum: 90 clock hours each quarter. Prereq: 5890 and consent of instructor. E
6940 Group Counseling Practicum (3) Supervised practicum with children and/or adults. Prereq: 5340, 5890, 5897, and 5940 and consent of instructor. May be repeated with consent of department. Maximum 6 hrs. W
6951-42-43 Practicum in Guidance, Counseling, and Personnel (3, 3, 3) Supervised practicum in college counseling and personnel practice. Minimum: 30 clock hours each quarter. Prereq: 5890 and consent of instructor. E
6944-45-46 Teaching Practicum (3, 3, 3) Prereq: Acceptance in doctoral program and consent of instructor. May be repeated. Maximum 6 hrs for each course. E
6950 Counseling Supervision (3) May be repeated with consent of advisor. Prereq: 5890, 5940, 6810, 6941. S/NC only. E
Special Education and Rehabilitation

MAJORS

Special Education
Vocational Rehabilitation Counseling

DEGREES

M.S.
M.S.

Professors:

Associate Professors:

Assistant Professors:
S. M. Benner, Ed.D. Columbia; K. H. Kopp, Ph.D. Georgia; T. F. Webb, Ph.D. Florida State

Instructors:
M. Griffin, M.S. Tennessee; D. D. McCampbell, M.S. Tennessee; N. E. Tedder, M.S. Minnesota; D. D. Tyler, M.S. Tennessee; K. M. Warden, M.S. Tennessee

Lecturers:
Z. H. Brody, M.A. Tennessee; H. L. Byrd, Jr., M.S. Tennessee; M. L. F. Teets, B.S. Memphis State

The Department of Special Education and Rehabilitation provides competency-based programs and experiences to prepare regular, special education, and rehabilitation personnel to work with exceptional persons: children and adults. Specialized courses may be distributed over the several areas of exceptionality with emphasis in an area of special interests 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) special education and rehabilitation. Programs lead to the master of Science degree in Special Education with an emphasis in one of the specialized areas. Under the sponsorship of the Office of Special Education and Rehabilitative Services (R.S.A.), a specialized institute for the preparation of professionals to adapt their skills 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. F, Sp

4190 Speech Development of Hearing Impaired (3) Anatomy and physiology of speech system. Relationship of hearing to speech development. Theories and techniques of speech development and improvement; for hearing impaired children. Prereq: Audiology and Speech Pathology 4190. F, Su

4200 Practicum in Speech Development of Hearing Impaired (3) Applications of theories and techniques of speech development and improvement with hearing impaired children. Prereq: 4190 and consent of instructor. (Same as Audiology and Speech Pathology 4200.) W, Sp

4210 Language Development of Hearing Impaired (I) Systems by which formal language is presented. Prereq: Admission to Teacher Education. (Same as Audiology and Speech Pathology 4210.) F, Su

4220 Language Development of Hearing Impaired II (2) Techniques; various systems by which formal language is presented. Prereq: 4210 or consent of instructor, admission to Teacher Education. (Same as Audiology and Speech Pathology 4220.) W, Su

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

4231 Communication Processes for Hearing Impaired II (3) Intermediate course in manual communications skills and techniques with emphasis on vocabulary development with receptive and expressive fluency. Prereq: 4230 or consent of instructor. A

4240 Nature of Hearing Impairments (3) Basic principles of audiology; anatomy and physiology of hearing; nature of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiograms; selection and use of hearing aids; relation of audiological services to medical and other rehabilitation disciplines. Observations and practicum. F, Sp

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.) E

4280 Curriculum Development in Elementary and Secondary Schools for Hearing Impaired (3) Adaptation of curriculum development and methods in public school education to meet needs of deaf and hard-of-hearing students in residential and integrated settings. Prereq: Admission to Teacher Education. W, Su

4290 The Teaching of Reading to Hearing Impaired Children (3) That the learner 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 4290.) E

4870 Student Teaching with Hearing Impaired Children (3) Supervised practicum with preschool, day school, and residential pupils. S/NC only. F, W, Sp

4871 Practicum with Hearing Impaired Children (3) That the learner 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 4871.) E

5230 Linguistics in the Education of the Hearing Impaired (3) Recent research and developments in linguistics related to hearing impaired. F, Su

5240 Seminar in Language Remediation for the Hearing Impaired (Current and recent developments in educational methodologies and to research pertaining to teaching language to hearing impaired. Research and materials current in use of various signs language systems and adaptations. Emphasis on approaches which accommodate and assist integration of hearing impaired children in regular classrooms. W, Su

5280 Seminar on Educational Implications of Language Deficiency (3) Readings, discussion, and projects on impact of language deficiency on educational programming for children with language deficiency. Sp, Su

5310-20-30 Manual Communication (2, 2, 2) Basic and advanced skills in signalled and signed forms of communication. Emphasis on ability to express and receive the manual forms. Prereq: Consent of instructor. Must be taken in sequence. F, Su; W, Su; Sp

5490 Educational and Vocational Guidance of the Deaf and the Hard of Hearing: Test techniques for diagnosis and guidance; social and personality adjustment; occupational opportunities. F, Sp

5520 Curriculum Development Applied to Programs for the Hearing Impaired (3) Current curriculum trends adapted for hearing impaired individuals. New curriculum options in education of these children. Current education theories for programs for hearing-impaired children. Prereq: Curriculum and Instruction 5580 or equivalent and consent of instructor. Sp

EDUCATION OF THE MENTALLY RETARDED

4110 The Nature and Concept of Mental Retardation (3) Identification, description, and study. E

4120 Education of the Mentally Retarded Child (3) Philosophy and rationale underlying teaching and guidance of mentally retarded; methods and materials in special and regular classes. Prereq: 4110, Admission to Teacher Education. E

4440 High School Program for the Mentally Retarded (3) Trends, issues and research relating to core and work study programs. Prereq: Admission to Teacher Education. E

4810 Student Teaching Mental Retardation (3) Prereq: Major in education of mental retardation. S/NC only. F, W, Sp

4811 Student Teaching Mental Retardation (9) Prereq: Major in education of mental retardation. S/NC only. F, W, Sp

4922 Student Teaching of the Educable Mentally Retarded (3) Observation and supervised practicum. S/NC only. E

5111 Psychology of Mental Retardation (3) Conceptual, functional, psychological theories and learning interrelations and theoretical and educational implications emphasized. Prereq: 4110. F, Su

5112 Psychology of the Severely Mentally Retarded (3) Program and curriculum development for training/education of severely retarded in public schools, institutions and privately operated schools and workshops. S/NC only. E

5113 Advanced Curriculum for the Mentally Retarded (3) Educational models, methodologies, and curriculum in education of mentally retarded children. Emphasis on varied curriculum alternatives to retarded child's education. Sp, Su

MULTIPLE DISABILITIES

4130 Education of the Brain-Injured Child (3) Nature of brain-injured child; skills for identifying educational, physical, and emotional characteristics; special educational techniques. Prereq: Admission to Teacher Education. E

4150 Education of Children with Crippling and Special Health Conditions (3) Medical and educational characteristics; appropriate educational modifications and associated services. Prereq or coreq: 3333 or consent of instructor, admission to Teacher Education. E

4840 Educational Problems of the Cerebral Palsied Child at Home and School (3) Physical, social, and educational needs of cerebral palsied; evaluative techniques; related services. A

4921 Student Teaching in Crippling and Special Health Conditions (3-15) Observation and supervised practicum in home, hospital, and classroom. S/NC only. E

EDUCATION OF THE EMOTIONALLY DISTURBED

4610 Nature and Characteristics of Learning and Behavior Disorders (3) Forms of academic and socially disturbing behavior, degrees of severity, possible causes, and related services. Relationships with respect to personality characteristics and development factors interpreted through behavioral and psychodynamic theory as well as practical situations in which learning and behavior disorders may occur. E
5830 Seminar: Issues and Theories in the Education of the Exceptional Child (3) Current trends in education of exceptional child, application of psychological approaches to education; analysis of current theories of integration as applied to exceptional child. Current research concerning education and/or rehabilitation of exceptional persons. Prereq: Curriculum and Instruction 5800 or Educational Psychology 5210 and consent of instructor. A

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

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. A

Vocational-Technical Education

MAJORS DEGREES
Agricultural Education M.S.
Business Education M.S., N.A.C.T.
Industrial Education M.S.
Vocational-Technical Education M.S., Ed.S., Ed.D.

Education Ph.D.

Professors

Associate Professors

Assistant Industrial Educators: R. Pierce, Ph.D. Ohio State; T. L. Powell, M.S. Oklahoma.

THE MASTER'S PROGRAM
The M.S. degree with a major in Vocational-Technical Education is available with concentrations in agricultural education, business education, distributive education, general vocational-technical education, home economics education, industrial education, and technical education. Requirements are:

Concentration
Research 18 hrs
Electives 6 hrs
Thesis 12 hrs
Total 45-51 hrs
All course work must be approved by the student's committee.

Each vocational service area (agricultural education, business education, distributive education, industrial education, 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 coordinators of the service areas.

THE SPECIALIST PROGRAM
The Ed.S. degree program is a cooperative undertaking involving all vocational service areas. Options are available in agricultural, business, distributive, home economics, 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 vocatioanal-technical areas.

The Vocational-Technical Education doctoral curriculum consists of the following: professional education core, 9 hours; service area, 18 hours: vocational-technical education, 18-27 hours; cognate fields, 9-18 hours; research techniques, 15 hours (consult advisor for details); and dissertation, 36 hours. A minimum of 120 hours above the baccalaureate is required.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 51.

General

4010 Development and Utilization of Advisory Committees (3) Craft advisory committees, selection, organization, implementation, and utilization.

4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Library and Information Science 4750.)

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise eligible for graduation 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/C only. E

5005 Problems in Lieu of Thesis (3) May be repeated. S/N/C only.

5101 History and Organization of Vocational-Technical Education (3) Vocational and technical education in public schools through analysis of social forces, legislation, and organization models.


520 Placement, Follow-up and Evaluation Procedures in Occupational Education (3) Methods and procedures in establishing placement programs, curriculum revision.

530 Organization and Operation of Area Vocational-Technical Schools (3) Area vocational-technical school concept: administration and supervision of vocational and technical education programs in area schools.

5401 Guidance and Personnel Services in Education (3) (Same as Educational Psychology 5401.)

5500 Supervision of Vocational-Technical Education (3) Program planning, coordination, instruction. Roles and functions of supervisors.
5055 Vocational School Administration and Management (3)

5070 Competency Based Vocational Education (3) Introductory, comparative, and practical approaches.

5080 Continuing Education in Vocational-Technical Education (3) Importance, objectives, historical development, psychological and sociological formulations, methods and techniques, research, evaluation.

5100 Occupational Program Development for Disadvantaged Persons (3) Academic, socioeconomic, cultural, and other handicaps that prevent individuals from succeeding in regular vocational education programs.

5110 Principles and Objectives of Vocational-Technical Education (3) Fundamental principles and contemporary objectives.

5130-31-32 Problems in Vocational-Technical Education (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.

5140 Individual Study in Vocational-Technical Education (1-3) Must be approved by supervisory instructor and service area coordinator or department head. Approval form must be filed in office of department head. May be repeated. Maximum 12 hrs.

5150 Microcomputer Operations and Educational Applications (3) Operating procedures and programming techniques. Hands-on experience in operating common microcomputers, writing, debugging, and running education programs. Prereq: Teaching, administrative, or related experience in schools or special instructor.

5155 Software Design for Microcomputers in Education (3) Advanced BASIC software design: operating System-CP/M, TRSDOS and OSI, sequential and random I/O, analysis and operation of commercial educational programs, and teacher-designed programs. Prereq: S5150.

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) Selection, analysis, and completion of problem necessitating original investigation, beneficial to investigator and vocational-technical field. P/NP only.

6000 Doctoral Research and Dissertation (1-15) P/NP only: E

6010 Curriculum Planning in Vocational-Technical Education (3) Prereq: Curriculum and Instruction 5410 or equivalent.

6020 Program Planning and Development in Vocational-Technical Education (3) Planning vocational-technical and work force state, local, and institutional programs; research in planning, advisory committees, planned change, administrative structures, and evaluation procedures.

6030 Evaluation of Vocational-Technical Education Programs (3)

6040 Seminar in Vocational-Technical Education (1) Required 3 consecutive quarters during residency. S/NC only.

6050 Administration of Vocational-Technical Education (3) Administrative principles and relationships to vocational and technical training.

6100 Research Development for Vocational-Technical Education (3) Advanced research methods for planning studies: proposal development, theoretical base development, research design, defining problems, and application of statistical techniques. Prereq: Two consecutive statistics courses, a research methods course and consent of instructor.

6111-12-13 Internship in Vocational and Technical Education (3, 3, 3) Field experiences in selected areas of vocational and technical education. S/NC only.

Agricultural Education

4230-31-32 Problems in Agriculture Education (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.

4240-41-42 Seminar in Agricultural Education (1, 1) Prereq: 4350 or consent of department head.

5210 Supervision of Student Teaching in Agricultural Education (3)

5220 Teaching Agricultural Mechanization in Vocational Agriculture (3) Prereq: 4350.

5230-31-32 Special Problems in Agricultural Education (3, 3, 3) May be repeated. Maximum 18 hrs.

5240 Current Literature in Agricultural Education (1-3) May be repeated. Maximum 6 hrs.

5250-51 Agricultural Education in Off-Farm Agricultural Occupations (3, 3) Developing occupational experience programs; course planning, teaching procedures. Prereq: 4350.

5260 Agricultural Education for First-Year Teachers (3) Adjustment to situation in which employed; group meetings in selected centers, and visits by instructor. Prereq: 4350.

5270 Adult Education in Agriculture (3)

5290 Supervised Occupational Experience in Agriculture (3) Prereq: 4350.

Business Education

5305 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, individualized instruction, occupational clusters.

5306 Organization and Management of VOE Programs (3) Developing office occupations, guideline in cooperatives, laboratory, and model office programs. Physical facilities, instructional aids, related instructional activities (clubs), enrollment, instructor and advisory committees.

5307 Measurement in Business Education (3) Evaluative methods and tools for all courses in business education and related areas of study in secondary and postsecondary business education.


5309 Evaluation of Research in Business Education (3) Prereq: Curriculum and instruction 5610 or equivalent.

5310 Graduate Seminar in Business Education (3) Review of techniques for research and preparation of proposal for thesis or problem/project.

5311-12 Special Topics in Business Education (1, 1)

5313-14-15 Practicum in Business Education (2, 2, 2)

5320 Improvement of instruction in Basic Business Courses (3) Issues, research findings, methods, and materials for improved instruction at both secondary and postsecondary levels.

5330 Improvement of Instruction in Typewriting and Clerical Programs (3) Research, principles of learning, issues and materials.

5340 Improvement of Instruction in Shorthand/Secretarial Subjects (3) Principles of learning, issues, research findings, and materials on secondary and postsecondary levels.

5350 Improvement of Instruction in Accounting and Data Processing Programs (3)

5360 Improvement of Instruction in Business Communications and Word Processing (3) Basics and strategies for teaching written communications. Word processing and oral communications.


5390 Problems in Business Education (1-9) Variable topics. May be repeated. Maximum 9 hrs.

6400 Supervised Experience in Business Education (3, 3, 3) Minimum 200 hours experience for each 3 credit hours in approved business education; concurrent analytical project. May be repeated. Maximum 18 hrs.

6440 Supervised Experience (3) Minimum 200 hours experience for each 3 credit hours in approved business education; concurrent analytical project. May be repeated. Maximum 18 hrs.

6470 Methods and Materials in Business Education (3) Prereq: 4460 or consent of instructor.

4480 Coordination Techniques in Business Education (3) Selecting training agencies; job analysis; selecting and briefing training supervisors; advisory committees; adult and other community services. Prereq: 4460, 4470.

4510 Administration and Supervision of Distributive Education (3) Operation of distributive education program; techniques used in evaluation. Understanding and appreciating problems from high school principal's and department head's point of view. Trends in distributive education; community surveys, state plans, teacher-coordinator qualifications, changing curriculum.

5416-26-36 Problems in Distributive Education: Retailing (3, 3, 3)

5420 Organizing and Teaching Adult Distributive Education (3) Developing, organizing, teaching, and evaluating continuing education programs in distributive education utilizing trade associations, employment agencies, business groups, and advisory committees in implementation.

5430-31-32 Special Problems in Distributive Education (3, 3, 3) Individual research, conferences, and workshops in teaching and supervising high school, postsecondary, and adult programs.

Home Economics Education

5510 Curriculum in Home Economics (3) Development of home economics educational programs. Prereq: 4240 or equivalent.

5515 Evaluation in Home Economics Education (3) Purpose of evaluation in development of home economics programs; techniques used in evaluation. Techniques for determining progress of students; individual problems of evaluation.

5530-31-32 Problems in Home Economics Education (1-3, 1-3, 1-3) May be repeated. Maximum 9 hrs per course.

5540 Teaching Family Relationships and Parenthood Education (3) Organizing, promoting, teaching, and evaluating continuing education programs in family economics programs; techniques used in evaluation. Techniques for determining progress of students; individual problems of evaluation.

5545 Home Economics Related Occupational Programs (3) Advanced study in planning, establishing, and evaluating home economic programs.
nematics related occupational programs. Prereq: 4509 or consent of instructor.

5550 Home Economics Adult Education (3) Development and administration of community-based home economics programs for adults. Prereq: Consent of instructor.

5555 Supervision of Home Economics in the Public Schools (3) For teachers with successful experience, supervision of home economics programs. Prereq: Consent of instructor.

5580 Teaching Home Economics in College (3) Methods, organization, and evaluation. Prereq: Consent of instructor.

5581 The Problem Method of Teaching Home Economics (3) Underlying philosophy, skills and techniques. Observation and discussion. Prereq: Consent of instructor.

5582 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.


Industrial Education

3830 History and Philosophy of Industrial Education (3)

3840-41-42 Part-Time Programs in Cooperative Industrial Training (3, 3, 3) Principles of organization, methods, and materials.

3850 Shop Organization and Management (3)

3860-51 Materials and Methods for Teachers of Shop and Related Subjects (3, 3)

3870 School Shop Safety (3)

4620 Special Topics in Drafting (3) Industrial practices in specialized areas of drafting selected for the individual student. Prereq: 6 hrs drafting.


4670 Manufacturing Processes (3) The manufacturing processes of industry and their relationship to careers. Prereq: 2620, 2641, 2650, 2651, or consent of instructor.

4671 Materials and Processes (3) Organic and inorganic materials and processes used to produce finished products. Content, curriculum and techniques of laboratory operation. Prereq: Consent of instructor.

4682 Power and Energy (3) Development, control, transmission, conversion, interrelationship of power sources; content, curriculum, and techniques of laboratory operation. Prereq: Consent of instructor.

4820 Foremanship Training by the Conference Method (3)

4830-31 Job Analysis (3, 3) Principles, practice, instructional methods.

4850-51 Curriculum Building in Trade and Industrial Subjects (3, 3) Course material in trade subjects, results of job analysis, checking sheets and individual job sheets in both trade and related subjects. Prereq or coreq: 4850.

4890-91-92 Seminar in Industrial Education (3, 3, 3) Educational innovations, current events, problems, and other topics associated with the field of industrial education.

4888 Organization and Development of Vocational Industrial Clubs of America (VICA) (3) To give industrial education teacher experiences and understanding of organization and operation of VICA. Prereq: Undergraduate degree and 3 yrs teaching experience is taken for graduate credit.

4890-91-92 New Developments in Industrial Education (3, 3, 3) Developments, pressing problems, and recent trends in field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

5810-11-12 Administration and Supervision of Industrial Education (3, 3, 3) Principles of vocational education, relationships with general education and trade and labor organizations, administering and supervising schools and classes under federal vocational education acts.

5830-31-32 Special Problems in Industrial Education (3, 3, 3)

5840 Methods of Research in Industrial Education (3)

5850 Improving Teachers in Service (3) Problems of coordination in part-time and apprentice training programs.

5860 Advisory Committees and Apprentices Training (3)

5880 Advanced Methods of Teaching Skills and Technical Information (3) Proper selection and effective application of contemporary methods and techniques in teaching of specialized skills and technical related information.


5995 New Developments in Industrial Technical Education (3) Prereq: B.S. in Industrial Education and teaching experience.

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, public health, 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 30 quarters hours of work selected from courses numbered 5000 and above are included in the M.S. requirement. Course selections 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 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 PROGRAM

The Doctor of Education and the Doctor of Philosophy degrees are offered in Health Education and the Doctor of Education in Physical Education. See further description under Health Education and Physical Education.

The basic requirements for admission are:

a. A minimum of 40 (physical education) or 50 (health education) quarter hours.

b. Submission of satisfactory scores on the aptitude section of the Graduate Record Examination is required for all doctoral and specialist programs.

c. A superior grade point average.

d. Submission of satisfactory references relating to training, employment, and character.

e. Evidence of successful teaching or potential for success in the major area of study.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page Graduate Assistantships. A variety of graduate assistantships are offered in health education, physical education, public health, 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 health, physical education, public health, safety classes and recreation classes, leading recreational activities, supervising public health or recreation field 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 37996-2700.

Departments of Instruction

Division of Health and Safety

MAJORS

Health Education

Safety Education and Service

School Health Education

DEGREES

Ed.D., Ph.D.

M.S., Ed.S.

Professors:

D. C. Wallace (Head), Ed.D., Colorado State; J. Gorski, Dr.P.H, California (Los Angeles); R. H. Kirk, H.S.D. Indiana.

Associate Professors:

M. A. Metzger (Emeritus), M.A. Yale, R. J. Purley, Ph.D. Iowa; A. P. Thompson, Ph.D. Michigan State.
The Health and Safety Division offers the following degree programs:

Master of Science degree with a major in School Health Education or Safety Education and a Non-Thesis Option (1, 1, 1) Individual identification and study of current problems in school health education. 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. E

4110 Driver and Traffic Safety Education (5) Preparation and teachers of driver education in schools and colleges. Students are required to teach at least one nondriver. Valid driver's license required. 3 hrs and 2 labs. E

4420 Advanced Driver and Traffic Safety Education (5) Development of competence in teaching of driver education through use of simulation, multimedia, and multiple-car driving range. Emphasis placed on teaching skills and supervision. Prereq: 4410. F, Sp, Su

4520 Workshop in Safety (3-5) Deals with special safety education problems. For advanced undergraduate students, graduate students, teachers, supervisors, and administrators. May be repeated. Su

5000 Thesis (1-15) P/NP only. E

4010-20-30 Problems in Safety (1, 3, 1-3, 1-3) Individual identification and study of current problems in safety. 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. E

School Health Education

3000 Foundation of Health Science (3) Personal health and contemporary health problems, i.e. mood modifying products, consumer health, human environmental factors and interrelationships in health program; relative contribution of health in-struction, health services, and healthful environment as each contributes to well being of individual students. Survey of existing health program; relative contribution of health in-

4110 First Aid and Emergency Care (4) Theory and practice, medical self-help. Leads to Red Cross Certification in Advanced First Aid and Emergency Care. (Applicant must be at least 18 years of age for certification.) E

3410 School Health Instruction (3) Selection of health content in the school curriculum. F, Sp

3510 The School in Community Health (3) Role of teacher in community health education; school's responsibilities in promoting healthful living and the place of existing media and agencies in program. Not open to health and physical education majors. E

3610 Methods in Elementary Health Instruction (3) Preparation and presentation of health topics. Teaching method emphasized and student participation stressed. Required for elementary teachers. Prereq: 3510 or Public Health 1110 or Nutrition 1230. E

3820 The Teaching of Sex Education (3) Trends, content, methods, and materials in sex education. F, W, Sp

4520 Drug Abuse Education (3) Problems and suspected causes; pharmacology of drugs and effects on society and methods of drug abuse education.

4430 Women's Health (3) Factors influencing women's health and women as consumers of nation's health service delivery systems. E

4500-10-20 Field Practice in Health Education (3-3, 3-3) Off-campus health education internship or field practice in educational or other agency with qualified professional. E

4710 Workshop in School Health Education (3-6) For advanced students, teachers, supervisors, and administrators. Lectures, demonstrations, films, field trips, and supervised research in special health problems. May be repeated. Su

8100-20-30 Problems in School Health Education (1, 1, 1) Individual identification and study of current problems in school health education. Extensive reading and critical analysis of safety literature. E

8580-80-90 Current Issues in Safety Education (1, 1, 1) E

6010-20-30 Internship and Research in Safety (3, 3, 3) Allows the student opportunities for engaging in field experience stressing their significant problems that will be identified, researched, and reported on in acceptable form. F

4520 Workshop in Safety (3-5) Deals with special safety education problems. For advanced undergraduate students, graduate students, teachers, supervisors, and administrators. May be repeated. Su

5520 Evaluation in School Health Instruction (3) Principles of objective tests construction; place of behavior and attitude scales, check lists, questionnaires, surveys, and inventories in evaluation of health instruction. Includes criticism of several commercial prepared tests and construction and standardization of test. W

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 health program. E

5540 School Health Administration and Supervision (3) Analysis of various types of administrative control; budgetary problems; education-public health relationship; responsibilities of school health personnel. Resource materials include case studies of on-going school health personnel. Resource materials include case studies of on-going school health programs. Sp

5550-40 Workshop in School Health Education (3-3, 3-3) Designed for graduate students, in-service teachers, and other health professionals. Emphasis in any workshop to be placed on one critical health issue. Sp

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 comprehensive manner. Su


4500-10-20 Field Practice in Health Education (3- 3-3) Off-campus health education internship or field practice in educational or other agency with qualified professional. E

4710 Workshop in School Health Education (3-6) For advanced students, teachers, supervisors, and administrators. Lectures, demonstrations, films, field trips, and supervised research in special health problems. May be repeated. Su

8100-20-30 Problems in School Health Education (1, 1, 1) Individual identification and study of current problems in school health education. Extensive reading and critical analysis of literature. W
Division of Physical Education

MAJOR

DEGREES

Physical Education

M.S., Ed.D.

Education

Ph.D.

Professors:


Associate 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, motor behavior, adapted physical education, and philosophical and sociological foundations.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 51.

3000- and 4000-level courses require a different level of performance of those registered for graduate credit.

4005 Advanced Ballet Technique (5) Styles and methods of advanced classical ballet technique: multiple pirouettes, battements, espacement and advanced pointe work. Prereq: 4000. Available to dance majors and minors or with consent of instructor. May be repeated. Maximum 6 hrs.

4010 Advanced Modern Technique (2) Development of integrated technique and synthesis of previous dance vocabulary, emphasis on advanced practice and principles. Prereq: 3030. May be repeated. Maximum 6 hrs. Available to dance majors and minors or with consent of instructor. F: W

4020 Practicum in Dance Production (2) Prereq: Consent of instructor. W: A

4050 Rhythmic Analysis (3) Nature and principles of music, rhythm, and rhythmic notation with emphasis on contemporary and historical dance movement and composition. Prereq: Consent of instructor. W: A

4060 Advanced Composition (4) Application of compositional, production and administrative skills culminating in a presentation of two complete choreographic works. Prereq: 3062, 4020. A

4080 History of Dance I (3) Survey of dance of various societies and cultures from pre-history through nineteenth century.

4090 History of Dance II (3) Survey of development of dance in theatre, recreation, and education during the twentieth century.

4110 Adapted 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. E

4140 Measurement and Evaluation in Physical Education (3) Relationship of measurement and evaluation in physical education. Administration and critique of appropriate measures of physical fitness, sports skills and knowledge. W: Sp, Su

4150 The Teaching of Creative Dance (3) Theory, methods, materials, and practical experience in presentation and integration of creative dance in grades K-6, A

4550 Methods of Teaching Dance (3) Principles and practical application in mini-teaching experience. Prereq: Upperclass or graduate standing and consent of instructor. Sp: A

4560 Movement Notation (3) Fundamentals with emphasis on notation and reading of elementary movement studies. Sp: A

5000 Thesis (1-18) P/NP only. E

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. Not counted toward credit requirements. May be repeated. S/NC only. E

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 most rigorous and sophisticated essay pieces concerning metaphysical, epistemological, and axiological status of sport. Prereq: Consent of instructor: W

5150 Systematic Physiological Analyses of Sport (3) Critical examination of most comprehensive, systematic, and revealing accounts of metaphysical, epistemological, and axiological status of sport. Prereq: S/NC only or consent of instructor. Sp

5220 Readings in Physical Education (3) Comprehensive review of literature in physical education and related areas. Sp

5280 Motor Behavior: A Theoretical Perspective (4) Motor behavior from information processing perspective and current research supporting theoretical base. Prereq: Undergraduate course in general psychology or consent of instructor.

5290 Motor Behavior Laboratory (2) Beginning experience in methodology and instrumentation for assessing factors relating to motor learning/performance. Prereq: S/NC only or 5320 or consent of instructor.

5310 Analysis of Basic Motor Skills (3) Mechanical analysis of basic motor skills, emphasizing application of these skills to physical education and athletics. W

5320 Seminar in Research Techniques in Physical Education (3) Evaluation of appropriate research methodology and its application to research in physical education. Prereq: 5340 or consent of instructor.

5330 Psychology of Sport (3) Human behavior in sport context. Prereq: General psychology course and consent of instructor. W

5340 Motor Behavior and Skill Acquisition (3) Application of research on human movement behavior to sport and physical education. Prereq: 4890 or consent of instructor. W

5410-20-30 Specialization Study in a Selected Physical Education Area (1-3, 1-3, 1-3) Advanced comprehensive study in selected specialized area within general fields of physical education. Prereq: Consent of instructor. E

5500 Advanced Kinesiology (3) Action of muscles involved in fundamental movements, calisthenics, sports, and gymnastics. Prereq: 5320 or equivalent. Sp

5510 Selected Topics in Anatomy (3) Intensive study of various systems of human body. Prereq: 5600 or equivalent. May be repeated with consent of instructor. S/NC only.

5550 Advanced Adapted Physical Education (3) Laws and regulations, theoretical bases for remediation or adaptation, programming implications. Prereq: 4110 or W

5580 Physical Activity and Health (5) Relationship of physical exercise to longevity, weight control, cardiovascular diseases, low back pain and other disorders, mental health, growth, and aging. Applications for maintenance of health. Prereq: Course in physiology of exercise or consent of instructor. 5 lectures per week. (Same as Public Health 5580.) Sp

5600 Applied Physiology (3) Principles of physiological study with special emphasis on application of physiological findings to practical problems related to human function. Prereq: 1 yr general chemistry, or consent of instructor. F

5610 Advanced Exercise Physiology (4) Principles of transfer of exercise in specials with special emphasis on integration of organization in systems adapting to required levels of muscular activity. Prereq: Zoology 4940 or equivalent. Recommended: 1 yr: chemistry, physics, and mathematics. 3 hrs and 1 lab. W

5620 Experimental Techniques in Applied Physiology (3) Laboratory course in experimental methodolgy and instrumentation. Respiratory and gas analysis, human calorimetry, blood chemistry, and pulmonary function tests. May be repeated with consent of instructor. S/NC only.

5650 Social-Psychological Dimensions of Physical Activity (3) Examination of sociopsychological factors which influence performance in physical activity with emphasis on research. Prereq: Psychology 3120 or equivalent. F

5810-20-30 Seminar in Physical Education (1, 1, 1) Current issues and problems in physical education with emphasis on outstanding studies and research in field. E

5900 Graduate Seminar in Public Health (1-3) (Same as Public Health 5900, Nursing 5900, Nutrition and Food Science 5910, and Social Work 5900.) S/NC only.

5910-20-30 Problems and Projects in Physical Education (1, 1, 1) 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 (3-15) P/NP only. E

6010 Seminar in Physical Education (1) Research topics in literature related to physical education. May be repeated with consent of instructor. S/NC only. E

6220 Independent Research (3) Selection of topic, development of procedure, and conduct of study including final writing of research paper. S/NC only. E

6330 Advanced Motor Behavior (3) Theoretical issues of contemporary significance in human motor behavior. Prereq: 5340 or consent of instructor. Sp

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.


6610 Seminar in Applied Physiology (2) Prereq: S610. May be repeated with consent of instructor. S/NC only. F: W

6640 Research Participation in Applied Physiology (4) Advanced research techniques under supervision of faculty member whose research area
coincides with interests of student. Prereq: Consent of instructor. May be repeated with consent of instructor. S/NC only. F

6810-20 Practicum (2-3) Intern experience in areas of major interest. S/NC only. E

Division of Public Health

MAJOR

DEGREE

M.P.H.

Public Health

Professors: C. B. Hamilton (Chairperson), Dr. P. H. Oklahama; J. Gore, Dr. P. H. California (Los Angeles); B. C. Wallace, Ed.D. Colorado State.

Associate Professors: J. E. McGuire, Ph.D. Michigan; R. J. Pursey, Ph.D. Iowa.


Lecturer: M. Duffy, M.D. Pennsylvania.

Master of Public Health degree with a major in Public Health. Option in community health education is available. Option in Education for Public Health. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

3310 Communicable and Noncommunicable Diseases (3) Modern concepts of diseases; etiology of common communicable and chronic disease problems including prevention and control. Prereq: 1 yr of biological science and 1 course in bacteriology. F, W, Sp

3320 Sanitation (3) History of sanitary awakening; disease-producing relationships and controls of water, sewerage, refuse, milk, meat and other foods, air, insects, and soil; sanitation of homes, swimming pools, industrial plants, markets, restaurants, camps, and public bathing places. Healthful school living as affected by buildings and grounds, lighting, acoustics, thermal control, and safety provisions. Prereq: 1 yr biological science, 1 course in microbiology. 2 hrs and 1 lab. F, Sp

4210 Urban and Industrial Health (3) Health problems created by a burgeoning population in the megalopolis; industrial health problems of concern to management, supervisor, and industrial worker, control of occupational diseases, poisons, accidents, and general conditions incident to industry. Sp

4220 Communications for Better Health (3) Selective study of communications in health enterprise. Consideration in logical progression of the problems of transmitting current and new information to practitioners; communications among members of the modern health teams, among health agencies, and uses of all mass media for transmitting health information. W

4410 Consumer Health and Safety Education (3) (Same as School Health 4410).

4700-10 Field Practice in Public Health (3, 3) Field practice in public health under supervision of public health profession. S/NC only. E

4730 Workshop in Public Health Education (3-6) 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. Su

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. E

5002 Non-Thesis Graduation Completion (3-5) 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. E

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. Su

5070-80-90 Field Practice Seminar in Public Health (3-5, 3-5, 3-5) Ongoing professional field experience under professional supervision in public health. S/NC only. E

5110 Environmental Health (3-5) Varied environmental factors are given. General work of air, food, water, shelter, transportation as they affect human life's survival, prevention of disease, performance and enjoyment. Lectures, demonstrations, laboratory, and field practice. Prereq: Consent of instructor. Su, F


5150 Industrial Toxicology (3) Elements of industrial toxicology as they relate to the improvement of occupational safety and health. Prereq: Consent of instructor. W

5200 Health and Sickness (3) Formulation of models of positive health within life cycle and within community of sickness affecting individuals and groups. Su, Sp

5410 Epidemiology (3) Incidence and prevalence of disease in man. W, Su

5420 Administration of Public Health (3) Administrative considerations of public health agencies including governing policy aspects, legal bases, organizational principles, personnel factors, fiscal management, and public relations. F, W, Sp

5430 Vital and Medical Statistics (4) Application of basic statistical principles to living things. F, W, Sp

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. W

5540 Factors in Problem Solving for Community Health (5) Test skills in communications and group process in route to problem identification, objective setting, problem solving and planning for health education. 4 hrs and 2 labs. W

5550 The Public Health Educator in Community Organization and Development (4) Overview of health organizations and agencies in the community that explore conflict in understanding and divergent styles of organization in community organization and development. Laboratory to delineate a community health campus and to practice. 2 hrs and 4 labs. F

5560 Functions and Roles of the Public Health Educator (3) Professional science is examined with special attention to roles and functions. Consideration of philosopher, teacher, counselor, and member of health organizations and agencies in the community. W

5570 Physical Activity and Health (5) (Same as Physical Education 5570.)

5705-10-15 Advanced Professional Health Education: Planning I, II, III (3-5, 3-5, 3-5) Theory and practice in selected areas. F, W, Sp

5735 Emergency Medical Services (3-5) Su

5750 Health and Medical Care Legislation and Law (3-5) Su

5755 Health Facilities Administration (3-5) W

5760 Health Services Administration (3-5) F

5785 Occupational Health Unit (3-5) Sp


5900 Graduate Seminar in Public Health (1-2) Scope of public health as discipline and interrelatedness to other academic and professional disciplines. Speakers both internal and external to UTK. Prereq: Baccalaureate degree in health-related field or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Nursing 5900, Nutrition and Food Sciences 5900, Physical Education 5900, and Social Work 5900.) S/NC only. F, Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6210 Health Aspects of Gerontology (3) (Same as School Health 6210.)

6220 Seminar on the Nation's Health (3) (Same as School Health 6220.)

6230 International Health (3) (Same as School Health 6230.)

Division of Recreation

MAJOR

DEGREE

M.S.

Recreation

Professor: M. Peters (Chairperson), Ph.D. Illinois.

Associate Professor: K. L. Krick, Re.D. Indiana.

Assistant Professor: M. D. Blanton, 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.

4130 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, masses and facilities, program services, finances, and public relations. Prereq: 3140, 3200, 3880, or consent of instructor. F, Sp

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. F

4310 Camp Administration (3) Program planning and organization, personnel management, camp site development and maintenance, camp operation for administrators and supervisors. W

4500 Specialized Study in a Selected Area of Recreation (1-9) Designed to deal with specific problems 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. E

5000 Thesis (1-15) P/NP only. E

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. E

5130 Interpretations of Leisure (3) Concepts of leisure including social, psychological, cultural, and philosophical; recreational use of leisure. Prereq: 3140 or consent of instructor. F

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. F

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. Sp

5240 Therapeutic Recreation (3) Role of recreation in lives and treatment of persons with disabilities—mental, physical and medical. Possibilities for help-
ing ill and disabled realize their full potential. Prereq: Consent of instructor. W

5250 Implementation 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. Sp

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. W

5300 Seminar in Recreation (1-6) Application of research methodology and computer literacy in selected areas of recreation related research. Presentations of students' research studies. May be repeated. Maximum 6 hrs. S/NC only. F, W, Sp

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: 4130. Sp

5350 Organizational Policies for Recreation (3) Advanced study in the analysis of organizational policies and functions of management in recreation. Prereq: 4130. W

5360 Management and Operation of Recreation Facilities (3) Management process as it pertains to operation of recreation facilities. F

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. E

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. E

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 5110, 5230, 5310, 5410, and 5120.

2. One or two minors or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or other related fields.


relations, chemical thermodynamics, corrosion, welding metallurgy and materials joining, solidification, microscopy (electron and optical), chemical process metallurgy, failure analysis, mechanical behavior of materials and structure analysis.

UTK-JAPAN COOPERATIVE PROGRAM IN POLYMER ENGINEERING

The UTK-Japan Program provides a means for Japanese research professors to teach part-time in the graduate program, and for students to participate in part-time study in Japan.

3620 Industrial Process Control (3) Design theory and practice. Experimental process modeling (process identification), feedback control, cascade control, feedforward control, degrees of freedom, stability analysis, controller tuning. Control systems for number of typical industrial unit operations. Prereq: 3610.

4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system extremals; statistical properties of samples and source systems; empirical modeling of processes; statistical process control. Prereq: 3420 and Mathematics 3150.
College of Engineering

W. T. Snyder, Dean
W. K. Stair, Associate Dean
W. A. Miller, Associate Dean
A. W. Spickard, Assistant Dean

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

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 and are played back at remote locations. Telephone contact is established periodically between the professor and the off-campus class to allow full discussion and questions. Occasional visits by the professor are made to each remote class and 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). Graduate courses have also been made available to engineers in industrial plants. Such courses are offered to students using classroom facilities at Jackson State and Columbia 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 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 UT 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.

Engineer Experiment Station

W. K. Stair, Director

The Station is organized to conduct investigations in fundamental engineering science and to aid in the development of the state’s resources and industries as far as funds available will permit.

The Station may also make special arrangements with any person or company to study any technical question within the capacity of its resources, and to report the results to the company requesting the study. In such case, the whole expense will be carried by the parties requesting the investigation.

Departments of Instruction

Chemical, Metallurgical and Polymer Engineering

MAJORS

- Chemical Engineering
- Metallurgical Engineering
- Polymer Engineering

DEGREES

- M.S., Ph.D.

Professors:

H. F. Johnson (Head); D. Eng. Yale, D. C. Bogue, Ph.D. Delware; B. S. Bone, Ph.D. Massachusetts Institute of Technology; C. B. Brooks, Ph.D. Tennessee; E. S. Clark, Ph.D. California (Berkeley); L. W. Crawford, Ph.D. Cincinnati, D. O. Culberson, Emeritus; Ph.D. Texas; J. F. Fellers, Ph.D. Akron; G. D. Frazier, Ph.D. Johns Hopkins; J. M. Holmes, Ph.D. Tennessee; H. W. Hu, Ph.D. Wisconsin; C. D. Lundin, Ph.D. Pennsylvania Polytechnic; C. J. Marquette, Ph.D. Kentucky; C. F. Moore, Ph.D. Louisiana State; D. F. Oliver, Ph.D. Pennsylvania State; J. J. Perone, Ph.D. Northwestern; J. W. Prados, Ph.D. Tennessee; J. S. Spruiel, Ph.D. Tennessee; E. E. Stansbury, Ph.D. Cincinnati; C. D. Thomas, Ph.D. Tennessee; R. A. Vandermeer, Ph.D. Illinois Institute of Technology; J. S. Watson, Ph.D. Tennessee; L. J. White, Ph.D. Delaware; M. A. Wright, Ph.D. Georgia.

Associate Professors:

W. T. Becker, Ph.D. Illinois; D. B. Bruns, Ph.D. Houston; R. M. Counce, Ph.D. Tennessee.

Assistant Professor:

F. Weber, Ph.D. Minnesota.

Lecturers:


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:

1Alumni Distinguished Service Professor.

*Space Institute, Tullahoma.
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 5110, 5230, 5310, 5410, and 5120.

2. One or two minor or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or other related fields.


4. Active participation in graduate seminars in the department. Resident students must register for the appropriate seminars totaling approximately 36 quarter hours, at least 12 of which must be in 6000 series courses. The polymer engineering major must include Polymer Engineering 5110, 5210, 5230, 5310, 5410, 5120, and Chemistry 5140.

5. Supporting courses in related scientific and engineering fields amounting to approximately 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.

6. The comprehensive examination, usually given in two parts, and covering such materials as chemical, metallurgical, and polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related and interdisciplinary fields.

7. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate seminars totaling approximately 36 quarter hours, at least 12 of which must be in 6000 series courses. The polymer engineering major must include Polymer Engineering 5110, 5210, 5230, 5310, 5410, 5120, and Chemistry 5140.

8. 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.

9. Appropriate languages are French, German, Japanese, Russian.

PROGRAM AREAS IN METALLURGICAL ENGINEERING

The metallurgical engineering program is flexible and interdisciplinary in nature. Students may be admitted to the program with an engineering background in metallurgical engineering; these may include physics, mechanics, chemistry, chemical engineering, mechanical engineering and materials engineering.

Prospective students should consult metallurgical engineering faculty concerning development of individual special programs compatible with their backgrounds. Areas of specialization within the program may be physical metallurgy of structure-property relations, chemical thermodynamics, corrosion, welding metallurgy and materials joining, solidification, microscopy (electron and optical), chemical process metallurgy, failure analysis, mechanical behavior of materials and structure analysis.

UTK-JAPAN COOPERATIVE PROGRAM IN POLYMER ENGINEERING

The UTK-Japan Program provides a means for Japanese research professors to teach part-time in their graduate program, and provides a joint Japanese-UTK program for the admission of Japanese students into the polymer engineering graduate program. A committee of faculty from Japanese universities makes recommendations for students and a UTK committee acts on them.

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 the Polymer Engineering department requires the following in each case: a thesis in the field, completion of Polymer Engineering 4910, 5110, 5310, 5410, 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. students 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. Ph.D. students must also pass a special written examination in polymer science and engineering, as well as complete the above requirements.

Chemical Engineering

3410 Flow of Fluids (4) Differential and overall momentum balances, fluid flow in tubes, piping systems, and packed beds; metering devices, pumps. Prerequisite: Chemical Engineering 4320, 5000, and mathematics 2850. 3 hrs and 1 lab.

3420 Heat Transfer (4) Differential and overall energy balances; steady and unsteady state, heat conduction in simple geometries; heat transfer in tubes and heat exchangers: condensation and boiling; radiation. Prerequisite: 3410. 3 hrs and 1 lab.

3440 Stagewise Operations (3) Analytical and graphical methods applied to stage-wise separations.

3450 Diffusional Operations (3) Diffusion, simul- concurrently with heat and mass transfer: applications including humidification, gas absorption, evaporation. Prerequisite: Chemical Engineering 4240, 5000. 3 hrs.

3810 Introduction to Process Dynamics and Control (3) Process modeling and introduction to control system design. Mathematical models for several industrial processes from mass, component and energy balances. Analytical and computational methods. Laboratory and data. Model linearization, LaPlace transfer analysis techniques, block diagram algebra, transfer function models, industrial sensors and valves. Lab. Prerequisite: Chemical and Metallurgical Engineering 2020, Mathematics 2840.

3620 Industrial Process Control (3) Design theory and practice. Experimental process modeling (process identification), feedback control, cascade control, feedforward control, control of freedom, stability analysis, controller tuning. Control systems for number of typical industrial unit operations. Prerequisite: 3610.

4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system characteristics: analysis of data and source systems; empirical modeling of processes: statistical process control. Prerequisite: 3420 and Mathematics 3150.

4120 Probabilistic Chemical Engineering Sys- tems (3) Experiment designs, simulation of stochastic systems, predictive techniques, and analysis of networks in the process industries. Prerequisite: 4110.

4130 Introduction to Optimization (3) Principles and applications of optimization techniques: chemical process design; unconstrained optimization, equality constrained optimization, inequality constrained optimization, and dynamic programming. Prerequisite: Mathematics 2840.

4410 Design of Separation Processes (4) Mass and heat transfer fundamentals applied to design of materials separation processes. Prerequisite: 3440-50.

4420 Process Design and Economic Analysis (3) Development of process design; information integration; process plant design. Product specifications, equipment characteristics, capital investment, operating costs and economic merit. Prerequisite: 4410.

4430 Special Problems in Design and Economics (4) Extension of 4420 for student participation in the American Institute of Chemical Engineering annual contest problem; other advanced design projects. Prerequisite: 4420.

4450 Hydrocarbon Processing (3) Study of special- ized 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. Prerequisite: 3440.

4470 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of domestic coals, sulfur distributions; beneficiation by both physical and chemical methods; fluidized bed combustion with both natural and synthetic SO2 sorbents; stack gas SOx scrubbing. Prerequisite: Consent of instructor.

4480 Coal Processing to Liquid Fuels (3) Charac- terization of various methods: modeling of conver- sion processes and equipment: extraction of water and oxygen requirements; pyrolysis; catalytic hydrogenation; reactor design considerations; re- view and critique of selected articles from both the current literature and patents. Prerequisite: 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. Prerequisite: 3420, Chemistry 3430.

4540 Fluid-Solid Operations (3) Heat and mass transport in fixed and fluidized beds: applications in- cluding absorption, ion exchange crystallization. Prerequisite: 3440-50.

4560 Advanced Process Dynamics, Simulation and Control (3) Development of process models, experimental and simulation of processes and control strategies, and analog versus digital process design. Control using advanced control concepts as feedback, ratio, cascade, and multivariable control. Advanced control system design for difficult control processes. Laboratory experience. Prerequisite: 3650 or equivalent background in basic control theory and differential equations.

4730 Mass and Energy Flow in Biological Sys- tems (3) Basic physiological and metabolic principles applicable to biological systems. Deriva- tions of general equations of biomass and energy transfer, thermodynamics of transport and equilibria in biological systems. Discussion of Volterra's equation and biological clocks. Prerequisite: Consent of instructor.
4740 Introduction to Transport Phenomena in Biological Systems I (3) Application of principles of transport phenomena to biological systems. Transfer of chemical energy and various cellular active trans-
port, structure and morphology 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; con-blication of chemical engineering principles and de-
velopment of chemical energy and various cellular active trans-
port processes. Prereq: 3440, 3450, or consent of instructor.

4760 Principles of Biochemical Separation (3) Fundamental aspects and similarities of modern biochemical separation methods; classroom demonstration, design of production and analytical sys-
tems. Prereq: Consent of instructor.

5000 Thesis (1-15) P/NP only. E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) Analytical formulation and solution of chemical, metallurgical and po-lymeer engineering problems involving deformation of solids, heat transfer and motion of fluids. (Same as Mechanical Engineering 5050 and Polymer En-
gineering 5050.)

5120 Heat Convection (3) Analysis of heat convec-
tion in fluids under viscous and turbulent flow condi-
tions, emphasizing analytical approach, simulta-
taneous 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, vari-
ational method, maximum principle, dynamic programming, and geometric programming. Prereq: 4130.

5210 Process Dynamics (3) Analysis of recycle op-
erations, steady state simulation and optimization of typical processes.

5250 Chemical Process Industry Economics (3) Analysis of economic components of chemical pro-
cesses, internal economies of chemical enterprise, decision making for investment in capital facilities. Prereq: 4120-30, 4420.

5310 Thermodynamics of Heterogeneous Equilibrium (3) Phase rule, equilibrium between phases, effects of temperature and pressure; ideal and nonideal solutions. Prereq: 3040.

5320 Statistical Thermodynamics (3) Basic con-
cept of statistical mechanics and application to evalu-
ation of thermophysical properties. Prereq: 5310.

5510 Chemical Reactor Design (3) Nonideal flow pat-
tterns, chemical reactor design, and control of reaction in two phase systems; introduction to heterogeneous catalysis and reactor stability. Prereq: 4530.

5610 Stagewise Mass Transfer Operations (3) Equilibrium stage, concepts applied to mass transfer operations, emphasizing nonequilibrium and multi-
component systems.

5620 Differential Mass Transfer Operations (3) Differential mass transfer operations; falling film, packed tower and bubble cap contacting devices; none-
othermal 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 En-
gineering Science and Mechanics 5220.)

5900 Special Topics in Chemical Engineering (3) Special topics of current interest to chemical en-
gineers. May be repeated. Maximum 9 hrs.

6000 Doctoral Research and Dissertation (3-15) P/NP only.

6130 Process Optimization (3) Optimization of chem-
ic process equipment and systems by various techniques; static and dynamic systems. Prereq: 5130.

6210 Advanced Diffusional Operations (3) Fixed and fluidized bed operations, stagewise and differ-
tential mass transfer bed concepts. Prereq: Consent of instructor.

6250 Venture Analysis in the Process Industries (3) Internal and external development of the chemical process industry, including the analysis of venture projects. Prereq: 5250.

6310 Thermodynamics ofIrreversible Processes (3) Thermodynamic models of irreversible chemical pro-
cesses and transport phenomena; coupling of chemical and mass transfer processes. Prereq: 5250.

6510 Applied Chemical Reaction Kinetics (3) Chemical reaction rate studies; correlation with phase transfer and solid state kinetics; plane strain; plane stress; failure and fracture; kinetic models of heterogeneous catalysis; catalyst effectiveness and role of transport in kinetics. Emphasis on development of phenomenological description although mechanistic models are discussed. Prereq: 5510.

6520 Catalytic Reactor Design (3) Principles of kinetics, heat and mass transfer applied to design and analysis of heterogeneous catalytic reactors. Prereq: 6510.

6710 Process Dynamics (3) Development of dyna-
mic models of process equipment from conservation and rate laws; testing of models by frequency, step, and pulse response methods. Prereq: Consent of in-
structor.

6900 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical engineers. May be repeated. Maximum 9 hrs.

Metalurgical Engineering

3050 Production Metallurgy (3) Roasting, smelting, and refining. Gas liquid equilibria, slag-metal proces-
ses and solution behavior, correlation with phase constitution. Kinetics of reactions, rate laws, acti-
vated complex theory, adsorption and catalysis and applications. Prereq: 3040, Chemical Engineering 3410 and 3420 or equivalent. 3 hrs or 2 hrs and 1 lab.

3110 Engineering Materials I (4) Introductory course correlating the atomic, crystal, and micro-
structure 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 prop-
erties of metals and alloys. Correlation of phase con-
mposition, thermal, and mechanical treatment; cor-
relation of resultant properties with service perfor-
mance. Suggested for mechanical, civil, and industrial engineering students.

3130 Engineering Materials III (3) Extension of 2110 or 3110 with emphasis on control of electrical and magnetic properties of materials by specification of composition of materials; correlation of resultant properties with service per-
fomance. Suggested for electrical engineering stu-
dents.

3140 Engineering Materials IV (3) Extension of 2110 or 3110 with emphasis on materials process-
ning, specification and evaluation. Suggested for mechanical and industrial engineering students.

3150 Engineering Materials V (3) Extension of 2110 or 3110 with emphasis on control of composition of materials, processing, and mechanical treatment; correlation of resultant properties with service perfor-
mance. Suggested for electrical engineering students.

3160 Engineering Materials VI (3) Extension of 2110 or 3110 with emphasis on materials of signifi-
cance in nuclear engineering; nuclear reactor con-
struction materials, nuclear fuel specifications, and interaction of radiation with solids to produce changes in engineering properties. Suggested for nuclear and mechanical engineering students.

3210 Plastic Deformation (4) Phenomena and theory of plasticity of single and polycrystalline mate-
rals. Applicable concepts of crystallography and x-

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.

3310 Biomedical Applications of Materials for Life Scientists (3) Principles of engineering mater-
ials for biologists, chemists, and physicists, emphasis on fabrication of components; corrosion; applications of prosthetic devices and dental materials. Prereq: Chemistry 1110-20-30 or equivalent.

3520 Materials Behavior and Chemical Process Equipment Design (3) Mechanical, metallurgical and chemical considerations in design of chemical processing equipment. Prereq: Chemical and Metal-
urgical Engineering 2030 or equivalent; 3150; and Chemical Engineering 3420.

3710 Metalurgical Applications in Manufacturing Technology (3) Fabrication methods and principles of mechanical/thermal processing for forgings 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: 3050 or consent of instructor.

4250 Design and Analysis (3) Design and labora-
tory sessions on analysis of materials, requirements and performance for engineering structures and com-
pounds. Prereq: Senior standing.

4510 X-Ray Diffraction and Its Application (4) Basic principles and application of x-ray diffraction from materials. Theory, powder diffraction, precision lattice technique, analysis and phase iden-
tification, preferred orientation. 3 hrs and 1 lab.

4540 Fracture-Safe Design (3) (Same as Engineer-
ing Science and Mechanics 4540.)

4730 Mechanical Metallurgy I (4) Elastic behavior; description of stress, strain, and stress-strain re-
lations; plane stress vs. plane strain loading; failure by yielding; stress concentration and notch sensitiv-
ity; ductile fracture; brittle fracture; fracture initiation and loading rate. Prereq: First course in Materials Science and Engineering Science and Mechanics 3311. Also suggested for mechanical engineering and engineering science students.

4740 Mechanical Metallurgy II (4) Brittle fracture due to mechanical and environmental factors; fa-
tigue, residual stresses; creep and stress rupture; fatigue; micro-crack; fatigue; plastic strain and stress-strain relations; fabrication by forging, rolling, deep drawing; formability testing. Prereq: 4730 or Mechanical Engineering 3450 and First course in Materials Science, or consent of instructor. Suggested for engineering science and mechanical engineering students.

4760 Casting and Welding (3) Principles and pro-
cesses of casting and welding; heat transfer, solidi-
fication segregation, gas-metal and slagmetal in-
teractions, thermal treatments, associated stresses. Prereq: 3120 or 3230, 3 hrs or 2 hrs and 1 lab.

5000 Thesis (1-15) P/NP only. E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) (Same as Chemical Engineering 5050.)

5110 Dislocations (3) Theoretical and experimental analysis of line defects and their interactions in solids. Prereq: 4730 or consent of instructor.

5120 Plastic Deformation (3) Geometry and mechanisms of polycrystalline deformed single crystals; slip and twinning; work hardening; effects of temper-
5130 Plastic Deformation II (3) Plastic deformation of polycrystalline materials; theoretical and experimental analysis of texture formation resulting from deformation and annealing. Prereq: 5120.

5140 Diffusion in Solids (3) Analysis of models and experimental observations relating to diffusion phenomena, some nucleation phenomena. Prereq: 5310.

5610-20 Advanced X-Ray Diffraction (3, 3) Generalized theory; crystal structure determination; thermal motion; lattice faults, diffuse scattering. Prereq: 5650.

5800 Special Topics in Metallurgical Engineering (3) Developments in the science and technology of metals and alloys. May be repeated. Maximum 9 hrs.

Polymer Engineering

4910 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. Not for credit for Polymer Engineering majors.

4920 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 theory, die design, extrusion, injection molding, rotation of fibers, injection molding. Not for credit for Polymer Engineering majors.

4930 Principles of Fiber and Textile Engineering (3) Chemical transformation of important fibers; melt, wet and dry spinning of manmade fibers; drawing and texturizing; preparation of yarn; dyeing, weaving and knitting. Emphasis on qualitative aspects.

4940 Plastics Fabrication Operations (3) Lecture and laboratory course treating unit operations of the plastics industry. Types and mechanisms of operation of machinery used and the structure and properties of fabricated parts. Operations to include extrusion, coextrusion, injection molding including structural foam, therforming, blow molding, rotational molding.

5000 Thesis (1-15) P/NP only. E

5610 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5650 Engineering Analysis (3) (Same as Chemical Engineering 5650.)

5710 Structural Characterization of Polymers with Electromagnetic Radiation (3) Theory of scattering and diffraction of electromagnetic waves by matter, special application to experimental techniques applied to polymers. Wide angle x-ray scattering (WAXS), small angle light scattering (SALS). Interpretations in terms of polymer chain conformation, crystal structure, morphology.


5310 Polymer Solution Properties and Characterization (3) Elementary thermodynamics; polymer-solvent interactions; analysis of spinodal and Isotherm behavior; thermodynamics, phase separation; application to synthetic and naturally occurring macromolecules. Prereq: Undergraduate physical chemistry.

5410 Rheology and Polymer Processing (3) Methods for determining the rheological properties of polymer melts, solutions and suspensions; linear viscoelasticity, simple and complex flows, single and multiple shear viscosities, viscous heat generation, application to processing particularly extrusion, injection molding, film formation.

5450 Principles of Injection and Blow Molding Operations (3) Theory; theoretical analysis of injection mold filling, structure of molded parts; principles of structural foam and sandwich molding; principles of shell theory, application to blow molding, structure and properties of blow molded containers. Prereq: 5410 or equivalent.

5510 Laboratory Methods in Polymer Engineering I (1) Basic experimental procedures for polymer characterization and processing, orientation, melt testing. Coreq: 5110 or consent of instructor. 2 labs.

5530 Laboratory Methods in Polymer Engineering II (1) Basic experimental procedures for polymer characterization, polymer melt processing, mechanical properties of polymers. Prereq: 5410 or consent of instructor. 2 labs.

5620 Textile Engineering Mechanics (3) (Same as Textiles and Clothing 5620.)

5710 Phase Transformations in Polymer Systems (3) Analysis of nucleation and growth of phases in polymer systems, spinodal decomposition, application to crystallization from the melt, precipitation from solution.

5740 Physical Properties of Polymer Structures (3) Measurement of weight and dimensional distributions in copolymers plus structures of two phase block polymers and polymer mixtures as related to glassy and crystalline transitions, phase incompatibility, thermal-mechanical, and optical properties.

5910-20-30 Metallurgical Thermodynamics (3, 3, 3) Application of thermodynamics and physicochemical principles to metals and metal alloys. May be repeated. Maximum 9 hrs.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110 Optical Properties of Polymers (3) Maxwell's equations and electromagnetic theory of light, optical properties of isotropic and anisotropic dielectrics including theory of birefringence, applications to anisotropics and fibers, studies of Stein, light scattering from polymer films.

6150 Advanced X-Ray Diffraction Methods for Characterization of Macromolecules (3) Classical methods of crystal structure determination; Patterson and Fourier functions; helical nets and Bessel function techniques; levels of order, thermal motions, defects, order-disorder transitions and para-crystallinity. Precision and Weisenberg photography, single crystal and powder diffractometry with applications to synthetic and biological macromolecules.

6210 Nonlinear Viscoelasticity (3) Tensor formulation of constitutive equations of viscoelastic materials subjected to large deformations. Integral, differential, and acceleration tension formulations. Applications to polymer flow problems. Prereq: 5210 or equivalent. (Same as Engineering Science and Mechanics 6800.)

6220 Advanced Methods of Polymer Processing (3) Application of theories of rheological properties and structures formation to analysis of polymer processing operations. Prereq: 5219.
MAJORS

Civil Engineering

M.E., M.S., Ph.D.

Environmental Engineering

M.S.

Environmental Science

M.S.

Emeritus Professor:

C. R. Walker, S.M. Massachusetts Institute of Technology, P.E.

Professors:

W. J. Stoops, Jr., Ph.D. Purdue; W. R. Brandes, M.S.

M. S., Illinois; E. G. Burdette, Ph.D. Illinois; A. Chatterjee, Ph.D.

North Carolina State, P.E.; J. W. Fortney, Department of Civil Engineering and the Master of Science in Environmental Science.

W. L. Finger-Rivlin formulation of isotropic non-linear elasticity. Prereq: 5120, 5410 or equivalent.

G. J. Hyfantis, Emeritus, B.S. Marquette, P.E.

G. D. Reed, Ph.D. Northwestern.

W. J. Boegly, Jr., Ph.D. Georgia Tech, P.E.

K. W. Heathington, Ph.D. Georgia Tech, P.E.

M. S. Bronzini, Ph.D. Vanderbilt; W. H. Crocco (Head), Ph.D. Michigan State, P.E.

W. Fortey, Ph.D. Purdue; J. A. Caglioletti, Ph.D. Yale, P.E.

R. L. Jolley, Ph.D. Purdue; F. J. Wegmann, P.E.

W. L. Finger, Ph.D. Illinois; P. J. Wu, Ph.D. Northwestern.

Associate Professors:

W. J. Stoops, Jr., Ph.D. Purdue; W. R. Brandes, M.S.

M. S., Illinois; E. G. Burdette, Ph.D. Illinois; A. Chatterjee, Ph.D.

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K. W. Heathington, Ph.D. Georgia Tech, P.E.

M. S. Bronzini, Ph.D. Vanderbilt; W. H. Crocco (Head), Ph.D. Michigan State, P.E.

W. Fortey, Ph.D. Georgia Tech, P.E.

R. L. Jolley, Ph.D. Purdue; F. J. Wegmann, P.E.

W. L. Finger, Ph.D. Illinois; P. J. Wu, Ph.D. Northwestern.

Assistant Professors:

E. S. Houglund, Ph.D. Virginia Polytechnic Institute; R. B. Robinson, Ph.D. Iowa State, P.E.

Lecturers:

J. M. Wright, M.S. Tennessee.

The Department of Civil Engineering offers courses leading to the Bachelor of Science, Master of Engineering, and Doctor of Philosophy with a major in Civil Engineering, concentrating in environmental engineering, structural engineering, soils engineering and materials, and transportation engineering; to the Master of Science in Environmental Engineering and the Master of Science in Environmental Science with concentrations in water quality, water resources, air quality, and solid waste.

MASTER OF SCIENCE PROGRAM

The Master of Science programs in Civil Engineering, Environmental Engineering, and Environmental Science are offered to graduates of recognized undergraduate curricula.

Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering, or certain undergraduate 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 degree 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 45 quarter hours, including a 3 quarter-hour special problems 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 Master of Science in Environmental Engineering, normally a bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: 1310, 1320, 1330, Engineering Science and Mechanics 2720, 3110, 3311, Environmental Engineering 3120, 3330, 4520; and Mathematics through the equivalent of 2860. In general, these must be completed before courses for graduate credit can be taken.

ENVIRONMENTAL SCIENCE

The Department of Civil Engineering offers courses which include topics of morphology, structure, characterization. Prereq: Consent of instructor.

Environmental Science with concentrations in water quality, water resources, air quality, and solid waste.

MASTER OF ENGINEERING PROGRAM

A graduate program in civil engineering leading to the degree of Master of Engineering is available to qualified graduates of EAC/A.B.E.T. accredited undergraduate curricula in civil engineering or environmental engineering. At least one-third of the program 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. The thesis and non-thesis option noted under the Master of Science program is available under this program.

THE DOCTORAL PROGRAM

A graduate program leading to the degree of Doctor of Philosophy is offered in Civil Engineering.

Specific departmental requirements for the Ph.D. degree include the following:

1. A minimum of 36 quarter hours credit in Doctoral Research and Dissertation will be required. A minimum of 36 quarter hours credit in Doctoral Research and Dissertation will be required.

2. A minimum of 36 quarter hours of graduate credit in the Civil Engineering Department, exclusive of thesis or dissertation credit, at least 9 hours of which must be 6000-level courses.

3. Supporting courses in related scientific and engineering fields, amounting to approximately 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 12 quarter hours of mathematics will be required beyond the civil engineering undergraduate requirements.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

5. Upon completion of at least one-half of all course work, each student must pass a comprehensive examination.

6. After completion of the dissertation, prior to graduation, each student must pass a final examination administered by a faculty committee.
Civil Engineering

4120 Concrete Design (3) Reinforced concrete continuous beams and floor slabs, footings, and retaining walls. Prereq: 3120. F; Sp


4240 Structural Design (3) Plate girders, composite steel and concrete beams, connections and details, and their analysis and design. Shear, bending moment, and deflections. Prereq: 3230 and 4410. 2.5 hr and 1 lab. W, Sp

4260 Photogrammetry (3) Methods of plotting maps from aerial photographs; stereoscopic plotting instruments; applications. Prereq: 2360 or Forestry 3070. F, Sp

4420 Analysis of Framed Structures (3) Maximum stresses due to moving loads; uses of influence lines; lateral forces due to earthquake and wind; analysis of portals, building frames and space frames. Coreq: 4410. W

4430 Construction Methods and Equipment (3) Fundamental operations in construction and selection and costing of equipment; production rates, balancing of equipment and labor. Coreq: 4540. W, Sp

4510-20 Advanced Structural Design (3, 3) Plastic design in steel and concrete; design of typical short span steel highway bridges in 4520. Prereq: 3230 for 4510; 3520 and 4110 for 4520. W, Sp

4520 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: 4430. F

4540 Computer Utilization (3) Computer use, economic justification, and extent of use by industry. Utilization of computers for solution of civil engineering problems. Prereq: 3320. F

4550 Stabilization of Soils (3) Mechanical stabilization of soil. Stabilization by mixing with cement and lime; chemical stabilization of soils with admixtures; waterproofing and modifying soils with additives. Prereq: 3315. 2 hrs and 1 lab. F

4620 Airport Planning and Design I (3) Emphasis on airport master planning. Included for consideration on the air side are runway configuration, capacity, geometrics and lighting; on the land side are terminal layout and design and ground access systems and parking. Prereq: 3600 and 3610. Sp

4640 Traffic Engineering (3) Characteristics of drivers, and their roadway and their interrelationship, traffic studies; basic considerations of traffic circulation and control; elements of urban transportation planning studies. F

4660 Airport Planning and Design II (3) Integration and application of principles of airport master planning for purpose of site selection and design of an airport facility through a comprehensive team project, includes environmental evaluation of design. Prereq: 4620. 1 hr and 2 labs. Su

4710 Portland Cement Concrete Mix Design (3) Properties and tests of portland cement concrete, methods of concrete evaluation testing; use of concrete admixtures. Prereq: 3710. 2 hrs and 1 lab. F

4720 Asphalt and Bituminous Concrete (3) Properties and tests of asphalts and asphaltic mixes, mix design and mixing plants, and emphasis on use of asphalt in transportation construction projects. Prereq: 3710. 2 hrs and 1 lab. W

4731-32 Earthquake Resistant Structures I, II (4, 4) (Same as Architecture 4731-32.) Su

4800 Introduction to Civil Engineering Systems (3) Methods of modeling civil engineering systems and their specific application to problems of transportation, environment, water resources and materials. Prereq: Senior standing or consent of instructor. Sp, Su

4850 Elementary Structural Matrix Methods (4) Introduction to structural analysis. Prereq: Engineering Science 4850.) Su

4860 Structural Wood Design (3) Application of structural design principles to structural members of wood, including connections, beams, columns, and diagonal bracing; wood construction with plywood. Various types of fastenings and connections. Prereq: 3230. F

5000 Thesis (1-15) P/NP only. E

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. E

5110-20 Statically Indeterminate Structures (3, 3) Deflections of beams and trusses; analysis by force methods and by slope-deflection in 5110; analysis by moment distribution and other displacement methods, secondary stresses in 5120. W, F

5140 Statically Indeterminate Structures (3) Analysis of complex planar and space frames. Prereq: 5110 and 5120. Sp

5150 Matrix Formulation of Structural Problems (3) Review of matrix algebra, vectors, stability considerations; stiffness and flexibility analysis of plane trusses, general members and structures composed of general members. Prereq: 4540 or consent of instructor. F

5160 Analysis and Design of Plate Structures (3) Bending and buckling of plates; analysis and design of bridge and building floors and structural plate components. Prereq: 5110. F

5170 Introduction to Structural Dynamics (3) Analysis of free and forced vibrations, and transient response of structures having many degrees of freedom; vibration of beams considered for structural systems: approximate design methods developed. Prereq: 5120, 5150. Sp

5180 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; plane stress, plane strain, axisymmetric, and three-dimensional elements; use of typical computer programs. Prereq: 5150, and Engineering Science and Mechanics 5860. (Same as Engineering Science and Mechanics 5180.) Sp, A

5220 Pavement Design (3) Pavement loads; pavement design; design practices; construction and maintenance. Prereq: 5110. W

5240 Advanced Properties of Materials: Cement and Concrete (3) Permeability and durability; volume changes and creep; elastic and thermal properties of concrete; causes of failure. Prereq: 4710. W

5250 Advanced Properties of Materials: Bituminous Substances and Mixes (3) Serviceability concepts; pavement failures and remedies; bituminous pavement maintenance techniques, other uses of asphalt products. Prereq: 4720. Sp

5270 Planning and Transportation (3) Preparation of transportation and elements of comprehensive development plans. Analysis of relationships between various transportation modes and between transportation and other community features. (Same as Planning 5270). W

5310 Engineering Practice (3) Evaluation and feasibility studies; preparation and legal use; engineering economics. F

5320-30 Engineering Practice Applied to Administration of Engineering Projects (3, 3) Engineering administration; planning, review of environmental and industrial projects; cost estimates and methods of financing. W, Sp

5410 Construction Contract Law and Administration (3) General construction contracts, construction related sales contracts. Emphasis on role of engineer in preparation, award, and administration of construction contracts. Case study method of instruction. Prereq: 4420 or consent of instructor.

5430-32 Construction Management I, II (3, 3) Management and organization of heavy and building construction projects. Prereq: 4430 or consent of instructor. F, W, Sp

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. W, Sp

5550 Slope Stability and Retaining Structures (3) Stability of natural and cut slopes and embankments, lateral earth pressure theories. Design of rigid retaining structures, sheet pile walls and anchored bulkheads. Coreq: 4220

5560 Shear Stress and Strength Strain Behavior of Soil and Shear strength of fine grain soil from perspective of idealized, simple clay. Drained and undrained shear stress and strain behavior of real soils. Consolidation theory. Coreq: 4220

5570 Soil Mechanics—Seepage (3) Saturated flow through embankments, filter design criteria, seepage forces and velocities, subdrains, and embankment failures. Prereq: 3310 or consent of instructor. Sp

5610 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; rotation between research results and current specialization for design. Prereq: 3230. W

5730 Prestressed Concrete (3) Properties of prestressing materials and anchorage systems; methods of pretensioning and posttensioning, analysis and design of members and continuous structures. F

5740 Behavior of Reinforced Concrete Members (3) Ultimate strength and behavior of reinforced concrete members; relation between research results and current specifications for design. Prereq: 4120. W

5800 Urban Systems: Engineering and Management I (3) Management of various urban systems usually under city manager and/or city engineer. Organization, finance, personnel administration, purchasing and equipment management and dealing with engineering consultants as each deals with municipal public works. Prereq: Graduate standing in Civil or Environmental Engineering or consent of instructor. W, A

5805 Urban Systems: Engineering and Management II (3) Continuation of 5800. Management and engineering of urban streets, including lighting, cleaning and snow removal, water supply and wastewater drainage, solid waste, air pollution and regulations. Prereq 5800. Su, Sp

5810 Traffic Engineering—Characteristics (3) Driver-vehicle-roadway system: level-of-service concept of capacity. Coreq: Statistics 3450. 2 hrs and 1-2 hr lab. F

5820 Traffic Engineering—Operations (3) Fixed-time and volume-determined systems; reversible 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. W

5840 Geometric Design (3) Advanced theory and practice in the geometric design of highways. Prereq: 4600. Sp

5850 Functional Design of City Streets and Urban Freeways (3) Effect of urban systems on growth and development; classification and function of streets, design features, including cross section, intersections, utility considerations, parking, effect of mass transportation: channelization; marketing; lighting; freeway, freeway road, surface street system. Prereq: Consent of instructor. Su

5860 Urban Transportation Planning (3) Prediction of traffic demands and vehicular flows; land use planning; parking needs. Prereq: 5810. F

5870 Public Transit Planning (3) Person movement, rapid mass transit, rail and bus transit, public transit; its various roles and how they fit community's need; user preferences; modal split models; total transportation. Coreq: 4220. Su

5880 Urban Transportation Planning (3) Prediction of traffic demands and vehicular flows; land use planning; parking needs. Prereq: 5810. F
5880 Highway Safety I (3) Transportation safety, highway safety statistics, legal issues, state-local relationships, current highway safety standards. Prereq: Graduate standing or consent of instructor.

5885 Highway Safety II (3) Effect of current tort law upon highway safety activities; roadside safety design, pedestrian and bicycle safety considerations; identification of high accident locations and system deficiencies. Prereq: 5880.

5890 Traffic Accident Reconstruction (3) Proper traffic accident data collection and analysis as basis of designating accident prevention or control programs. Many contributing factors to an accident; proximate and secondary causes as they relate to roadway improvements. Prereq: 4640 or 5810 or consent of instructor. Sp, A

5900 Special Problems in Civil Engineering (1-9) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to civil engineering students in non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5910-20-30 Special Topics (1-6, 1-6, 1-6) Topics related to current developments in civil engineering not included in other courses. May be repeated.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6100 Research Development (3) Development of research activities in private and public sectors. Improving skills to become competitive in attracting research funding; developing plans for long-term, 6000-level course requirements in doctoral programs. Prereq: Graduate standing and consent of instructor.

6120 Research Management (3) Management strategies for research programs/projects. Long range and day-to-day management requirements. Course cannot be used to satisfy 6000-level course requirements in doctoral programs. Prereq: Gradate standing and consent of instructor.

6740 Behavior of Reinforced Concrete Beams and Frames (3) Ultimate strength and behavior of statically indeterminate reinforced concrete structures; applicability of elastic analysis to framed structures; limit analysis. Prereq: 5120 and 5740. Sp, A

6750 Behavior of Reinforced Concrete Slabs (3) Behavior, analysis, and design of plate girders, columns and composite members subjected to static and dynamic loading. Prereq: 5170 and 5610. Sp, A

6760 Statewide Passenger Transportation Planning (3) Comprehensive multimodal transportation planning system; transportation functional classification, programming and scheduling. Emphasis on government policy decisions, as they affect air and highway investments. Prereq: 5860. W, A


6800 Planning Models for Transportation Systems II (3) Analytical analysis of modal split, trip distribution, and trip assignment. Mathematical, statistical, and computer science techniques in modeling process. Models integrated for urban transportation planning process. Prereq: 6880. Sp, A

6910-20-30 Special Topics in Civil Engineering (3) Problems of current interest in civil engineering. Prereq: Consent of instructor. E

Environmental Engineering

4000 Environmental Protection (3) Managing of water resources, bodily wastes and wastewaters; air environmental quality; public health; pollution control; many contributing factors to air; pollution control to safeguard public health; principles of physical, chemical, and biological treatment processes; management of storm water for beneficial use. Prereq: 3330. Sp

4210 Water Resources Engineering Design (3) Planning and design of multipurpose dam project, including reservoir, dam, and discharge control works. Considerations of dam safety and environmental impact. Microcomputer applications. Prereq: 3330 or consent of instructor. F

4220 Water Resources Engineering Development (3) Mathematical analysis and numerical techniques for computing and selecting among water resources development alternatives; achieving project optimality; single- and multi-objective methods. Prereq: 3330 or consent of instructor. W

4330 Hydrologic Design (3) Application of frequency and return period concepts to hydrologic design of water resources system; unsteady surface runoff and stormflow modeling; urban peak runoff design using kinematic wave theory; evaluation of effects of land use changes on stormflow quantity and quality. Prereq: 3330. W


4520 Elements of Water and Wastewater Treatment Systems Design (3) Unit operations and processes employed in physical, chemical and biological treatment of water and wastewater. Application of unit operations and processes in design of water and wastewater treatment plants. Prereq: Engineering Science and Mechanics 3110 or consent of instructor. Sp, Su

4525 Water and Wastewater Treatment Plant Design (3) Design of wastewater design of water and municipal industrial wastewater treatment plants; sludge handling systems, ultimate disposal of residuals. Prereq: 4520. Sp

4530 Environmental Engineering Laboratory (3) Standard analytical techniques for evaluation of specific air, water, and solid waste pollutants. Prereq: 4000. 2 hrs and 1 lab. W

4600 Solid and Hazardous Waste Management (3) Magnitude and characteristics of solid and hazardous waste problems; collection systems; disposal systems including landfill, incineration, composting, fixation, resource recovery, and proposed new technologies; current and future regulations. Prereq: Junior standing. Sp

4700 Air Pollution—Air Resources Management (3) Introductory course on concepts of air pollution; analysis of relationship among emission sources, meteorology and topographic factors, and adverse effects on receptors; safeguarding approaches for air pollution control. Sp

4820 Environmental Engineering Law (3) Legal aspects of water and air pollution, drainage, land use controls and environmental impact statements; emphasis upon federal-state relations, recent legislation and court decisions, and enforcement. Prereq: Senior standing. F

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student wishes to graduate prior to the degree completion. May not be used toward degree requirements. May be repeated. S/NC only. E

5230 Open Channel Hydraulics (3) Open channels and culverts; principles and applications of uniform flow, gradually varied flow; unsteady flow; flood routing; dam break flood analysis; spatially-variied flow. Microcomputer applications. Prereq: Engineering Science and Mechanics 3110 or consent of instructor.

5232 Sediment Transportation (3) Sediment properties and measurement; bed loads and suspended load; movement and deposition of sediments by flowing water; silting of reservoirs and related topics. Prereq: 5230. W

5234 Flood Damage Reduction (3) National, regional, local flood problems; hydrologic design criteria; traditional flood control measures; land use controls and adjustments; floodproofing, flood insurance, and other flood damage reduction elements. Interdisciplinary approach in floodplain management; case studies. Prereq: Consent of instructor.

5261 Basic Principles of Remote Sensing (3) Applications of remote sensing to engineering, forestry, meteorology, land use planning, and resource management; properties of electromagnetic radiation including basic concepts in geometric optics, and the interaction of EM radiation and matter; current data handling technology. Prereq: Consent of instructor.

5262 Remote Sensing Data Acquisition (3) Active and passive sensors, their areas of special application and limitation; description of remote sensing platforms, including the Earth Resources Satellite Systems; mission planning. Prereq: 5261 or consent of instructor.


5301 Stormwater Modeling I (3) Interpretation of hydrologic data using methods of systems analysis. Hydrologic components are analyzed as linear and nonlinear systems integrated into mathematical models of watershed response. Optimizing model parameters with illustrative examples. Prereq: Consent of instructor. W

5302 Stormwater Modeling II (3) Continuous streamflow records interpreted using methods of stochastic hydrology, including flow frequency and time series analysis. Hydrologic design of water resources systems using streamflow simulation techniques including auto regression and fractional Brownian motion models. Prereq: Consent of instructor. Sp


5330 Descriptive Hydrology (3) Occurrence and description of elements of hydrologic cycle, effects on earth and relation to humans. Not for civil engineering majors.

5400 Introduction to Environmental Systems (3) Models of air and water quality, water resources, solid waste disposal, and location of central facilities; environmental control and management problems, optimization of these systems. Prereq: Graduate standing, Civil Engineering 4800 or consent of instructor. Sp

5501 Water and Wastewater Treatment Theory I (3) Theory of unit processes employed in sanitary engineering. Prereq: 4520. F
of wind shear and diffusion from urban area sources. Prereq: 5725.

5900 Special Problems in Environmental Engineering (1-9) Seminar in special problems, not included in other courses. Prereq: consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5910-20-30 Special Topics (1-6, 1-6, 1-6) Problems and topics related to current developments in field of environmental engineering or its discipline. Emphasis on those systems used for wastewater reclamation. Prereq: Graduate standing or consent of instructor.

5511 Water Quality Management (3) Water quality control objectives, methods, and philosophies; water quality criteria; effects of various uses on water quality; receiving water characteristics and waste assimilation capacity; regulatory standards; economic considerations. Prereq: 4520. W

5582 Microbiology for Sanitary Engineers (3) Microorganisms and microbiological processes significant in sanitary engineering, including basic microbiology, detection and identification, enzymes, metabolism, interactions, energy transfer, synthesis and growth; aerobic and anaerobic biological treatment processes. Prereq: Graduate standing. Sp

5593 Advanced Environmental Engineering Laboratory (3) Application of modern and typical methods for pollution control, to analysis of environmental pollutants. Prereq: 4530. 2 hrs and 1 lab.

5670 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air monitoring, and dispersion of pollutants. Prereq: Graduate standing. F

5710 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air monitoring, and dispersion of pollutants. Prereq: Graduate standing. F

5715 Ambient Air Monitoring (3) Physical and chemical techniques for ambient air monitoring. Survey network design. Quality control of air monitoring data. Use of air monitoring data in air quality management programs. Prereq: Consent of instructor.

5720 Air Pollution Particle Collection Theory (3) Mechanics of particles suspended in gaseous media, including diffusion, coagulation, and aerodynamic capture of particles. Prereq: Environmental Science and Mechanics 3110. W

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. Computer Science 3150. Sp

5730 Air Pollution Control Device Design (3) Design and evaluation of systems used to control emission of gaseous and particulate air pollutants. Comprehensive design of specific devices and systems. Prereq: 5720. Sp

5735 Industrial Source Sampling (3) Sampling methods; gaseous and particulate air emissions from industrial processes. Prereq: Graduate standing. 2 hrs and 1 lab. Su

5745 Ambient Air Chemistry (3) Reaction mechanisms for production of secondary air pollutants from anthropogenic primary pollutants and naturally occurring precursors. Prereq: Consent of instructor.

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 instantaneous and continuous sources, diffusion in a zone

5762 Distinshed Service Professor.
may not be used if 5000-level courses are available in the same area.

3. A minimum of 36 quarter hours credit in doctoral dissertation.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

5. Satisfactory performance on both a qualifying and comprehensive examination.

The qualifying examination is prepared by the electrical engineering faculty and consists of a 3-hour written examination in each of four areas. Areas (1) mathematics and transform methods, and (2) basic passive and active networks are required of all Ph.D. students. Areas (3) and (4) are usually chosen from two of the 12 graduate course divisions in the department and cover material from undergraduate courses. A student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. The qualifying examination will be administered after the completion of 36 hours of graduate course work or immediately after completion of a Master's degree. A minimum of 27 hours of graduate course work must be completed after the student has taken the qualifying examination first time.

The comprehensive examination is prepared by the student's doctoral committee and consists of a 3-hour written examination in the student's major area, a 2-hour written examination in a related area, and an oral examination. The comprehensive examination is normally taken at least six months after passing the qualifying examination. Part of the comprehensive oral examination will be a defense of a formal written dissertation proposal. The comprehensive examination must be passed and the dissertation proposal accepted by the student's doctoral committee before the student is reported as ready for admission to candidacy for the Ph.D. degree.

6. Participation in departmental seminars.

Many of the electrical engineering courses are regularly offered in evening small classes. Engineers working in industry are encouraged to participate in the department's graduate program.

Departmental graduate programs provide special opportunities for academic and research work in areas pertinent to atmospheric and space 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: 3009.


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 2650.

3080 Propagation I (3) Propagation of waves in transmission lines and in other guiding systems. Impedance and reflection analysis of transmission lines, standing wave and traveling wave measurements. Introductions to impedance matching, transmission line filtering, microstrip circuit construction, graphical and computer-aided design methods. Prereq: 3050, 3 hrs including lab.

3080 AC Power (3) Magnetic circuits, iron cored coils; transformers, construction, calculation of performance from equivalent circuit, parameters for equivalent circuit, 1-phase and 3-phase connections, "per unit" notation; induction motors, constructional features, analysis of performance using equivalent circuits. Prereq: 3050. 3 hrs including lab.

3090 Energy System Operation (3) Power system component modeling and system structure. Basic analysis techniques for automatic control, detection, stability, faults, and system protection. Prereq: 3090. 3 hrs including lab.


3120 Basic Electrical Engineering—Electronics (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including lab.

3130 Basic Electrical Engineering—Machinery (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including lab.

3180 Logic Design of Digital Systems (3) Introduction to boolean algebra and design of combinational circuits. Presents gate and flip-flop characteristics. Design of clocked and sequential systems. Other systems using memory. Introduction to minimization techniques. Architectures and system components to include basic circuits, 1-phase and 2-phase systems. Prereq: 3110. 3 hrs including lab.

3190 Plasma I (3) Engineering applications of plasma physics; conversion devices including photovoltaic and P-N junctions; simple power supplies; operation of electronic devices; microwave tubes with applications (electric, electronic, and MHD, controlled nuclear and plasma reactions in advanced power production). Prereq: Physics 2310-20-30. 3 hrs including lab.


3310 Basic Electronics I (3) Band theory fundamentals, theory and applications of p-n junctions, simple power supplies; theory of operation of field effect transistors and applications in simple circuits. Coreq: 2000. 3 hrs including project laboratory.

3320 Basic Electronics II (3) Physical operation of bipolar transistors and vacuum tubes with applications in basic amplifiers. Integrated circuit fundamentals. Prereq: 3610. 3 hrs including project laboratory.


4020 Direct Energy Conversion (3) Background physics; conversion devices including photovoltaic power sources, solar cell arrays, conventional and advanced stationary generation systems and heat pumps, magnetohydrodynamics, fuel cells, related aspects of d.c.-a.c. inverter and energy storage. Prereq: 3330. 3 hrs including lab.

4080 Microwave Circuits and Electronics (3) Scattered wave description of circuits, to include isolators and amplifiers, couplers and power dividers, circulator phase shifters, loading and interconnection of systems. Power generation and amplification by vacuum devices and by solid state (bulk and junction devices). Microwave switching, filtering and multiplexing. Prereq: 3060. 3 hrs including lab.

4090 Propagation II (3) Metal tube, dielectric rod, and stripline waveguides. Waveguide resonators and other loading components. Design of structures utilizing microstrip transmission and microwave integrated circuits. Prereq: 3060. 4 labs.


4370 Introduction to Feedback System Design (3) Mathematical formulation of control systems; steady state error and error constants; root-locus method; optimum gain and phase margin for linear systems; introduction to compensation. Prereq: 3720. Lab optional.

4410 Power System Components and Control (3) Modeling of transmission lines and cables; R-L-C calculations and power flow limitations. Control of real and reactive power flows in interconnected power systems; the PF and QV control problems. Prereq: 3090.


4430 Transmission, Distribution, and Protection (3) Studies in underground and d.c. transmission; consideration of over-voltages and insulation requirements; system protection against faults. Prereq: 3060, 3090.

4460 Lasers and Masers (3) Introduction of principles of laser and maser operation based on classical concepts and electron spin resonance. Consideration of practical devices and applications.

4470 Plasma II (3) Magnetohydrodynamics. Prereq: 3190.

4480 Plasma III (3) Macroscopic plasma equations, particle orbits, interactions, oscillations and waves. Prereq: 3190.


4500 Electro-optics Detection and Instrumentation (3) Sensitivity, resolution (frequency response) and noise concepts of practical engineering data for both spatial and temporal detection (e.g. photographic emulsions) and temporal detectors (e.g. photo-detectors) to be given. A portion of the course will be devoted to selected electro-optical instrumentation systems (e.g. laser light scattering, optical data processing, holographic interferometry).


4570 Electro-Acoustics (3) Wave equation for sound, radiation from pistons, impedance of a piston, loudspeakers, horns, and other loading devices. Microphone recording and reproduction, tape recording and re-
production, noise reducing systems. Prereq: Senior standing.

4600 Analog Signal Processing Circuits for Elec-
tronic Instrumentation (3) Operational amplifiers,
instrumentation amplifiers and integrated circuits in
signal processing. Active filters, amplifiers,
attenuators, function generators, active rectifiers,
and adjustable ladders. Analysis of oscillating
problems between transducers and signal-processors.
Prereq: 3830. 3 hrs including project laboratory.

4610 Analog-Digital Systems (3) Principles of ana-
log-to-digital conversion components. Applied to analog com-
cputing to include problem set-up and scaling. Char-
acteristics of analog multipliers, dividers and func-
tion generators are developed. Presents compara-
tors, digital-to-analog conversion, and analog to digi-
tal conversion techniques. Prereq: 3180 and 3830. 3 hrs
including biomedical lab.

4620 Sequential Machine and Digital System Theory (3) Considers design aspects of pulse-
mode, clock-mode, and level-mode sequential cir-
cuits, memory, and cache memories, and considerations of one- and
two-dimensional iterative networks. Design of large scale
digital systems using MSI and LSI technologies. In-
troduces principles of reliability and error detection in
digital systems. Prereq: 3180. 3 hrs including
biomedical lab.

4630 Digital System Organization and Design (3) Considers system organization of digital systems in-
cluding minicomputer and microprocessor architectures and comparisons. Characteristics of ALL
digital systems (mode of operation, synchronous
operation, and clocking) and input-output devices are developed. Control unit organization to includ-
several structured methods of operation, synchro-
nous-asynchronous time sequencing and micropro-
gramming of control functions. Prereq: 3180. 3 hrs
including biomedical lab.

4660 Bioelectric Instrumentation (3) Nature and
genesis of bioelectric potentials, transducers, amplifier
requirements, recording systems and noise prob-
lem. Prereq: 3180. 3 hrs including project laboratory.

4690 Electronic Amplifiers (3) Feedback amplifier
principles. Wideband linear amplifiers. Audio and
radio-frequency power amplifiers. Prereq: 3830,
3720. 3 hrs including project laboratory.

4690 Communications Electronics (3) Receiver and
transmitter development and design for one- and
two-dimensional iterative networks. Design of large scale
digital systems using MSI and LSI technologies. In-
troduces principles of reliability and error detection in
digital systems. Prereq: 3180. 3 hrs including
project laboratory.

4700 Digital Integrated Electronics (3) Compara-
tors, logic gates, flip-flops, registers, counters,
metering and analog switches, A/D and D/A conver-
version, clipping, clamping and sweep circuits. Prereq:
3830, 3180. 3 hrs including project laboratory.

4740 Integrated Circuits (3) Processing and fab-
rication of active and passive components for mono-
lithic and hybrid circuits. Design techniques for linear
and digital circuits. Prereq: 3830. 3 hrs including
project laboratory.

4780 Synchronous Machines (3) Construction and
application, analysis of performance from equivalent
model for round rotor and salient pole machines. Park's transformation to the 2-axis model and use in
transient studies; introduction of 2-axis equivalent to
generalized theory of electrical machines. Prereq:
3090.

4790 Controllable Motor Drives (3) Constructional
features and design parameters for usual variations of the
d.c. motor; a.c. servomotor; stepping motor; development of transfer functions and examples of their
application in control system. Prereq: 3090.

4800 Hardware-Software Interface in Minicom-
puters (3) Specialized Microprocessor Design (3) Fur-
furts mmininteler and microprocessor interface design. Hardware-software interaction and trade-off.
Project oriented, contract course. Completion of two pro-
jects utilizing a microcomputer and one or more
microprocessors, are minimal course requirements.
Prereq: 3180.

4810 Discrete-Data Systems (3) Introduction to
analysis and design of discrete data control systems.
transformers. Formation of system network characteristics such as Z, Y, and H. Other computer methods. Prereq: Graduate standing or consent of instructor.

5420 Fault and Load Flow Studies (3) Analysis of power system under short and series fault conditions. Math problem formulation and solution. Load flow problem is formulated with computer methods emphasized. Prereq: 5410 or consent of instructor.


5440 Distribution System (3) Electric power distribution with particular reference to utility systems. System growth and planning, operation and regulation. Prereq: 4410, 4420, 4430 or equivalent.

5460 Selected Topics in Power Systems (3) To meet special needs of students. Possible topics: power systems reliability, interconnected system theory, power plant operation, electrical transistors in power systems, and power system relaying. Prereq: Consent of instructor. May be repeated with consent of department.

5510-20-30 Advanced Analog Electronics (3, 3) Physical operation of modern electronic devices with emphasis on devices such as diodes, bipolar transistors, J-FETs, and MOSFETs. Small-signal equivalent circuits and noise models of active devices. Analysis of linear and wideband low-noise feedback amplifiers and radio-frequency amplifiers using discrete, monolithic and hybrid devices. Voltage and current amplifiers. Designing, switching regulators. Use of specialized electronic systems in analog signal processors. Advanced topics in analog electronics from current literature. Prereq: 4370, 4600, 4870 or consent of instructor: Coreq: Mathematics 4510 or 4710. Project laboratory included.

5540 Thick-Film Hybrid Microcircuits (3) Processes 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 biweekly laboratory.

5570-80-90 Advanced Electronic Switching Circuits (3, 3, 3) Switching circuits using active devices in discrete, monolithic, and hybrid configurations; clipping and clamping circuits, negative resistance circuits, comparators, time-base generators, sweep circuits, blocking oscillators, analog switches, logic families, registers and counters, analog-to-digital and digital-to-analog converters, and digital memories. Prereq: 4700 or consent of instructor. Project laboratory included.


5615-25 Introduction to Switching Theory and Logic Design (3, 3) Boolean algebra and applications. Combinational switching circuits. Sequential machines. Information structures and sub-systems. For computer science majors and those who wish to take advantage of experience in hardware and logic design. Prereq: Elementary linear algebra and calculus of several variables. 4 labs per quarter. Prereq: 5710.


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 relationships, equipment design, and system performance in noise. All modern systems; emphasis on digital data systems. Prereq: 5710.

5670-80 Pattern Recognition (3, 3) (Same as Computer Science 5840-50.)

5690 Artificial Intelligence (3) (Same as Computer Science 5840-50.)

5700 Random Process Theory for Engineers (3) Probability and random variables as approached by set theory. Statistical averages and transformations of random variables. Random processes, stationarity, correlation functions and temporal analysis, power spectrum and spectral analysis as applied to response of systems to random signals.


5740 Digital Processing of Signals (3) Analysis of discrete signals; sampling theorem and its application; frequency domain design of digital filters; time domain design of digital filters; quantization effects; processing of digital signals; discrete Fourier transform. Prereq: 4100 or equivalent.


5770 System Identification (3) Various identification schemes and methods. Analysis and synthesis of linear and nonlinear systems. Prereq: 5110 or consent of instructor. Coreq: Mathematics 4510 or 4710.

5780 Power Transmission Lines (3) New and unconventional power transmission systems. Transmission line parameters for overhead and under-ground lines. Corona and radio interference of high voltage transmission. Insulation coordination and protection. Design procedures for high voltage transmission. Prereq: 4110-20-30 or equivalent.

5810-20 Electromagnetic Fields (3, 3) Vector analysis, Maxwell's equations, special relativity, plane waves, reflections, waves in anisotropic media, guided waves, rectangular and cylindrical wave guides, radiation from current elements. Coreq: Mathematics 4510 or 4710.

5820 Linear Antennas and Antenna Arrays (3) Hertzian dipole, linear antennas, impedance loop antennas, receiving antennas, linear arrays. Prereq: 5820 or equivalent.

5840 Aperture Antennas (3) Huygens principle, equivalent currents, Fourier transform and optical transfer function. Horn, lens, and reflector antennas. Prereq: 5820.

5850 Microwave Electronics (3) Space charge waves on electron beams, coupling between beams and guided waves. Klystrons, magnetrons, traveling wave amplifiers and backward wave oscillators. Prereq: 5820.

5860 Electromagnetic Wave Propagation (3) Wave propagation in isotropic and dispersive media, transmitted power, stored energies, propagating and nonpropagating modes, orthogonality properties, reciprocity, and radiation conditions, sources. Prereq: 5820.

5870 Introductory Microwave Networks (3) Circuit equivalents for n-port, junctions, obstacles, loading and filtering. One way and two way two devices, directivity, analogous devices, parameter measurements, reflection charts. Prereq: 5810. Coreq: 5820.

5920 Digital Image Processing (3) Theory and techniques for systems with two-dimensional sampling and interpolation, image representation and transforms, image enhancement, restoration, reconstruction, filtering, and medical image description, scene analysis and scene matching. Prereq: 4830 or consent of instructor.

5940-50 Advanced Small Computer Systems (3) Real-time applications, memory and CPU organization, interface software, and peripheral devices of microcomputer and microcomputer systems studied. Project-oriented supported by hardware and software materials. Prereq: 4850 or equivalent or consent of instructor. (Same as Computer Science 5940-50.)

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.


6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) (Same as Physics 5650-10.)

5650 Special Topics in Image and Pattern Analysis (3, 3) Discussion of current literature and applications. Prereq: Consent of instructor. Coreq: Mathematics 4510 or 4710.


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.

6800-10-20 Advanced Topics in Electronic Instrumentation (3, 3) Selected advanced topics in electronic instrumentation based on particular interests of students. Fundamental physical processes in instrumentation transducers including thermal-electric, magnetoelectric, electromagnetic and quantum electronic devices. Physical operation of modern discrete, monolithic, and hybrid electronic structures and their application in signal processors. Resolution, sensitivity, noise, and these considerations in signal processors used in modern
The flexibility and interdisciplinary aspect 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 be best 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:

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<td>Mathematics</td>
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<tr>
<td>Engineering courses</td>
<td>18</td>
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<tr>
<td>(Major option; may include but is not restricted to courses offered by the Engineering Science and Mechanics Department.)</td>
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<tr>
<td>Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses.)</td>
<td>9</td>
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<td>Thesis</td>
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A final examination is required under both plans, covering graduate course work and the thesis (if any).

THE DOCTORAL PROGRAM

General policies and requirements of The Graduate School relating to admission, residence, languages, research, examinations, faculty advisory committee, and admission to candidacy apply to this program.

Specific departmental requirements for the Ph.D. degree include:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the Master's thesis. These shall include a minimum of 36 quarter hours credit in Doctoral Research and Dissertation and a minimum of 72 quarter hours credit in other courses.

2. A minimum of 36 quarter hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 5000 and above, with at least 12 quarter hours of 6000-level courses, which constitute one or two areas of concentration selected by the student.

A final examination is required under both plans, covering graduate course work and the thesis (if any).

The names and addresses of four references selected from a department other than the student's may be included for the Ph.D. student subject to the approval of the student's advisory committee and receive committee approval of the proposal before being admitted to candidacy for the Ph.D.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy within the College of Engineering/Engineering Administration have been designed for students who desire to extend their education beyond the Bachelor's degree, exclusive of credit for the Master's thesis. These shall include a minimum of 36 quarter hours credit in Doctoral Research and Dissertation and a minimum of 72 quarter hours credit in other courses.

A final examination is required under both plans, covering graduate course work and the thesis (if any).
College of Engineering/Industrial Engineering

3700 Dynamics (4) Kinematics of rigid bodies; mass moments of inertia; friction; energy function; kinematics of rigid bodies using force, mass, acceleration; work-energy; impulse-momentum. Not for departmental graduate credit. Prereq: 3200 or Basic Engineering 1320, Mathematics 2840.

3710 Intermediate Dynamics (3) Three-dimensional dynamics of particles and rigid bodies; dynamics of bodies with varying mass and velocity; motion; LaGrange's equations. Prereq: 3700, Mathematics 2850.

4020 Computer-Aided Design (3) Use of computer graphics and analysis programs for design of selected systems, structures, and components. Evaluation of design alternatives. Prereq: 4810.

4520 Biomedical Fluid Mechanics (3) Discuss objectives, review foundations and present developments in biomedical and fluid mechanics. Properties of human blood and blood vessels, determinants of cardiac performance, analysis and measurement of flow and pressure in arteries, nonintraoral study of circulatory system, mechanics of microcirculation. Applications to areas of hemodynamics, thrombosis, and flow in various arteries. Prereq: 5110 or a course in fluid mechanics or consent of instructor.

4530 Biomechanics (3) Discuss objectives, review foundations and present developments in areas of mechanical properties of living tissues, biomechanics of injury and prosthetic devices, biomechanics of prosthetic devices, and biology and biomechanics of nonprosthetic systems. Interpretation and development of research. Prereq: 3311 or 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 temperatures, R-curves, stress intensity factors, and J-integrals; the use of these properties in design. Prereq: 3110 and Metallurgical Engineering 2110. (Same as Metallurgical Engineering 4540). 3 hrs or 2 hrs and 1 lab.

4580 Principles of Nondestructive Testing (3) (Same as Physics 4580).

4610 Experimental Stress Analysis (3) Basic concepts: theory, techniques, and instrumentation of resistance strain gauge; stress concentration; strain gage impact. Prereq: 3311 or 4500 or consent of instructor.

4620 Dynamic Data Acquisition (4) Instrumentation of measuring systems for dynamic events and responses; design considerations; oscilloscopes; digital oscilloscopes; magnetic tape recording; telemetry and data transmission; data processing. Prereq: 3311, 4710, Electrical Engineering 3120. 3 hrs and 1 lab.

4630 Introductory Photomechanics (3) Introduction to photomechanics, photoelastic coating method. Moire method, interferometry, and holography. Prereq: 3310, Physics 2320. 2 hrs and 3-1/2 lab.

4710 Fundamentals of Vibrations (3) Free and forced vibrations of damped and undamped lumped parameter systems; energy methods. Prereq: 3720, Mathematics 2840.


4810-20 Engineering Analysis (4, 4) Integration of fundamental physical laws and mathematical methods into the solution of realistic engineering problems. Prereq: 3110, 3311, and Mathematics 3150.

4850 Elementary Structural Matrix Methods (4) (Same as Architecture 4850 and Civil Engineering 4860).

4910 Special Engineering Science Topics (3) Problems related to recent developments and practical problems. Open to juniors or seniors with consent of instructor. May be repeated. Maximum 6 hrs.

5000 Thesis (119) P/NP only. E

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 be used toward degree requirements. May be repeated. S/NC only. E

5110-20 Fluid Dynamics (3, 3) Kinematics of fluids, vorticity, rate deformation, plane and axially symmetric stream functions, Navier-Stokes equation, exact solutions, stream function and boundary-layer approximations; nonviscous flow, potential theory, complex potentials, conformal mapping. Prereq: 5800.

5130 Introduction to Turbulence (3) Macroscopic effects; analogous stress-streatment, correlation functions, energy spectra, diffusion; application of turbulent jets and pipe flow. Prereq: 5800.

5140 Finite Element Methods in Fluid Mechanics (3) Computational fluid mechanics using finite elements. Basic methodology; initial-value techniques; matrix interaction; accuracy and convergence concepts. Large viscous boundary layer flow; inviscid and aerodynamic flows; 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 in flow phenomena; application of Navier-Stokes equations; numerical methods of solutions; stress-optic methods of laminar flow analysis. Prereq: Mathematics 4610. (Same as Chemical Engineering 5610.)


5410-20 Theory of Elasticity (3, 3) Stress, strain in three dimensions; torsion and bending of prismatic bars, axially loaded structures, stress concentration; plane stress, plane strain. Prereq: 5800.

5430 Thermal Stresses (3) Heat conduction, thermoelastic equations; thermal stresses in beams, rings, plates, and shells; thermal buckling problems. Prereq: 5410 or 6310-20-30, and Mechanical Engineering 3440.


5560 Photoelasticity (3) Physical optics, wave motion, polarized light, basic principles of photelasticity, equipment, and techniques, application to two-dimensional elasticity and stress concentration, numerical methods in photelastic stress analysis, photelastic coating methods, three-dimensional photoelasticity. Prereq: 3311, Mathematics 4610, and consent of instructor.

5710-20 Advanced Dynamics (3, 3) Physical laws relative to translating and rotating reference frames; rigid body dynamics; variational methods; Lagrange's equations; Hamilton's principle. Prereq: 3710 or 4710, Mathematics 4610.


5800 Introduction to Continuum Mechanics (3) Fundamentals of mechanics of solids and fluids. Cartesian tensors; stress, deformation, and flow in continuous medium; constitutive equations, applications to solids. Prereq: 3310 and 3311 or equivalents. Mathematics 4610.


5860 Introductory Finite Element Methods (3) General finite element analysis and computational requirements; programming concepts. Stress analysis, heat transfer, fluid flow, and solution 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 in the field. May be repeated with consent of instructor.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110-20 Advanced Topics in Fluid Mechanics and Convective Transfer (3, 3) Survey of literature on advanced convective transfer, 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 speed flow of phenomena not reacting and reacting systems. Prereq: 5110-20 or equivalent. Mathematics 4610, 4540-50, 4710.


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 or 5312.

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; phenomenological theories; extremum and variational problems; principles in perfectly plastic solids; finite plastic deformations; piecewise linear plasticity. Prereq: 5410 and Mathematics 4550.

6610 Photoelasticity (3) Stress-optic law in three dimensions and index ellipsoid, rotational effects in three-dimensional photoelasticity, techniques and applications of two-dimensional photoelasticity, scattered light method, dynamic photoelasticity, photoelasticity, photoelasticity, and photomechanics, recent developments in photoelasticity. Prereq: 5640, 5420 and consent of instructor. 2 hrs and 3 labs.

6800 Nonlinear Viscoelasticity (3) (Same as Polymeric Engineering 6210).

6910 Special Topics in Engineering Mechanics (3) Advanced problems of interest in mechanics, worked either as a 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.

Professors: J. W. Snider (Head), Ph.D. Ohio State, P.E., W. W. Claycombe, M.E.

College of Engineering/Industrial Engineering 81
4150 Project Control with CPM and PERT (3) A study of project control methods and the development of a critical path system and models for resource allocation, cost/time-tradeoff algorithms, multi-project control, and computer programs. Prereq: 3430.

4160 Materials Handling (3) Analysis and planning for the overall problem of moving, packaging, and storing of raw materials, work-in-process, and finished goods. Topics include cost analysis, distribution, and transportation. Prereq: 4520 and Engineering Science 3310. Not available for graduate credit for industrial engineering students.

4200 Production Facilities Design (4) Materials handling, plant layout, service areas, inventory control, process and control applications, and operating procedures design. Prereq: 3630, 3510-20, 4060, 4520.

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.

4250 Work Measurement Applications (3) Application of learning curves, queueing theory, standard data methods and incentive systems to the design of industrial work situations.

4520 Engineering Economy (3) Methods and problems in selection or replacement of equipment. Decisions among engineering alternatives, involving capital, operating, and replacement cost, 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 to actual problems faced by competitive firms and regulated industries. Case studies taken from literature form basis of classroom discussion. Out-of-class assignment is made which involves working with local companies to evaluate make or buy options, leasing versus cash purchases, equipment replacement studies, energy source economies. Prereq: 4520.

4540 Industrial Development (3) Factors other than mechanical or chemical which enter into successful establishment of manufacturing enterprise. Cost and location studies and market analysis to determine the commercial feasibility of new plants or projects.


4900 Predetermined Time Systems (3) Work design and measurement using predetermined time system; methods time measurement, basic motion study, work factor. Theory and application. Prereq: 3630.

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduate Completion (3-15) Required for the non-thesis option students. Only completed 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. E

5110 Work Design (3) Advanced methods analysis of design and improvement of work systems, human factors, workers' response and management participation. Prereq: Motion and time study or work methods and design.

5210 Advanced Work Measurement (3) Characteristics of predetermined time systems, application to formula construction, and practice in application. Prereq: 3630 or 3620.

5240 Facilities Planning and Design (3) Modern facilities handling techniques, computer-aided layout techniques, applications of operations research models, and use of these to design manufacturing facility. Prereq: Production facilities planning or consent of instructor.


5280 Information Systems Design (3) Systems engineering approach to information systems design. Model system, analysis, and evaluation of information systems, system objectives, and design criteria. Optimization and simulation in system design.

5280 Production and Inventory Systems (3) Application of OR techniques to production and inventory systems for form solutions, search criteria, and use of available computer codes. Prereq: 5700. Coreq: 5710.


5600 Human Factors Engineering (3) Human characteristics which influence design of tools, equipment, environments, and products. Modeling of humanity as process or system controller. Prereq: Consent of instructor.


5700 Optimization Methods in Industrial Engineering (3) Optimization techniques required in 5710, 5720, and 5730. Classical optimization theory, N-dimensional geometry and calculus of variations, selected areas of operations re-
search. Prereq: Computer Science 3150 and matrix algebra.

5701 Operations Research Applications (3) Survey of operations research techniques with emphasis on application to industrial engineering problems. Prereq: Mathematics 2360 (or equivalent), Statistics 3450, computer programming. Available for credit only to students without a B.S. degree in industrial engineering.

5710 Linear, Quadratic and Separable Programming (3) Mathematical programming; linear programming, quadratic programming, and separable programming. Computer solutions to programming problems. Prereq: Computer Science 3150 and matrix algebra.

5720 Queuing Models and Simulation (3) Theory and application of queuing line models and simulation methods employed to evaluate complex queuing systems. Data analysis and hypothesis testing related to pertinent queuing line probability density functions. Prereq. 5700, 5360.

5730 Game Theory and Random Processes (3) Operations research including game theory with applications to decision making in competitive environment, and random processes with applications to queuing, inventory models and decision making. Prereq: 5360.


5900 Design Project (1-9) Industrial engineering topic to fulfill design project requirement in nonthesis program. Enrollment limited to industrial engineering majors. May be repeated. Maximum 9 hrs. S/NC only.

5910-20-30 Special Topics in Industrial Engineering (3, 3, 3) Special problems for students qualified to do individual or group research projects. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


6570 Nonlinear Programming (3) Optimization techniques for static and dynamic nonlinear systems subject to various constraints. Applying optimization theory to solve nonlinear optimization problems. Variable metric methods, search methods, constrained nonlinear programming, and penalty function methods. Prereq: 5700.


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 groups as appropriate. Prereq: Graduate standing and consent of instructor. May be repeated with consent of department.

5770 Mechanical and Aerospace Engineering

**MAJORS**

**Aerospace Engineering**

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**Mechanical Engineering**

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**Professors:**


**Associate Professors:**


**Assistant Professor:**

- P. E. George, Ph.D. Purdue.

**GRADUATE STUDY PROGRAMS**

Graduate programs in Mechanical Engineering or Aerospace Engineering are available which lead to the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy with concentrations in solar energy, energy conversion and utilization, power generation, machine design and energy, energy conversion and utilization, heat transfer and fluid mechanics, and thermodynamics. In addition to the general policies and requirements of The Graduate School, the 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 A.B.E.T.-accredited undergraduate curricula in mechanical or aerospace engineering. 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 work.

**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.

**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.

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 are left to the student's committee. The requirements of this option are that the student must satisfactorily complete a program of study which 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 program.

3. Passing a comprehensive written final examination on all coursework 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 9 quarter hours credit in Selected Engineering Programs (5900). A written report must be presented for each problem investigated.

3. Participation in the departmental seminar program.

4. Passing a comprehensive written final examination of all course work submitted for the degree and an oral examination of 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 background. The student must satisfactorily complete an approved program of study which normally includes:

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*Space Institute, Tulahoma.*
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 12 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 use more than one 4000-level engineering course to meet their advanced degree requirements. Non-mechanical or non-aerospace engineering graduate students should consult with instructors regarding prerequisites for undergraduate courses.

Mechanical Engineering
3110 Applied Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties; applications to engineering problems.
3511 Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties; applications to chemical engineering problems.
3330 Engineering Thermodynamics (3) Properties of gases and mixtures; chemical reactions; equilibrium, applications to mechanical engineering problems.
3410 Fluid Flow (3) Development of continuity, momentum and energy principles for fluid systems; applications of mechanical and aerospace engineering systems.
3440 Heat Transfer (3) Heat transfer processes, heat conduction, thermal radiation.
3520-30-40 Thermal Sciences (3) Fundamental principles of thermodynamics and transport phenomena as applied 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.
3650 Introduction to Machine Design (3) Ductilebrittle 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.
3910 Engineering Analysis (3) Advanced analysis techniques for problems of aerospace and mechanical engineering. Emphasis on approximate methods.
4140 Energy Conversion Systems (3) Operating and design characteristics including new technology development; selected direct conversion techniques.
4150 Energy Conversion Systems (3) Fossil fuel systems with emphasis on coal technology.
4160 Design of Energy Conversion Systems (3) Synthesis and design of system including economic and technical aspects. Participation in team design effort including formal presentations and design report.
4170 Turbo-Machinery (3) Basic principles of turbo-machinery; systematic methods or analysis, design, performance evaluation. Navier-Stokes equations to infinite and finite bearings; analytical and numerical solutions; applications to design.
4180 Energy Production and Utilization (3) Thermodynamics constraints on energy production; comparison of power 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.
4420 Heat Transfer (3) Heat transfer by free and forced convection, heat transfer with phase change, heat exchanger applications.
4450 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, temperature, pressure, transducers, rates, and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.
4621 Manufacturing Processes (3) Comparison of machining methods, plastic production, metrology, and efficient production tools and molds, work holding fixtures.
4622 Tool Design (3) Principles underlying tool and die design, design of high-volume production tools and molds, work holding fixtures.
4624 Manufacturing Engineering Systems Design (3) Design of complete manufacturing system for a particular product: manufacturing planning, tool and fixture design, selection of manufacturing operations, redesign of product to reduce cost.
4625 Manufacturing Process Engineering I (3) Product specification; dimensioned analysis of size and form, tolerance; process planning; operations, workpiece analysis; and workpiece control for production to tolerance.
4631 Energy Methods in Mechanical Design (3) Application of strain energy principles in complex beams and structures.
4650 Materials and Manufacturing Process (3) Selection of materials in design process, emphasizing relationship between stress and strain analysis, material properties, environment, temperature, manufacturing technology and cost.
4670 Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements: springs, bearings and shafting, selection of sleeve and rolling element bearings.
4680 Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements: springs, bearings, and shafting, selection of sleeve and rolling element bearings.
4710 Thermal Environmental Systems (3) Vapor compression and absorption cycles; heat pump systems; moist air properties; psychrometric processes.
4720 Thermal Environmental Systems (3) Design analysis of air washers, cooling towers and extended surface coils; solar radiation; building heat transmission; physiological effects.
4730 Thermal Environmental Systems (3) Design of heating ventilation and air conditioning systems.
4740 Solar Energy Utilization (2) Nature and availability of solar radiation; review of selected heat transfer topics pertinent to solar energy collection and use; design analysis of solar energy collectors and method of storage; selected applications.
4810 Internal Combustion Engines (3) Thermodynamic phenomena in internal combustion and propulsive engines: combustion, detonation, equilibrium, dissociation. Analysis of internal combustion engines using ideal and real fluids.
4910-20 Selected Topics in Mechanical Engineering (3, 3) Problems related to developments and practice in mechanical engineering.
5000 Thesis (1-15) P/NP only. E
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/C only. E
5110 Conduction Heat Transfer (3) Analysis of steady state and transient heat conduction by analytical and numerical techniques. Prereq: 3910, 4420 and Mathematics 3150.
5120 Convection Heat Transfer (3) Equations of viscous fluid flow, energy equation, convection analysis of internal and external flows including effects of convection boiling and post dry-out heat transfer; two phase flow and pressure drop; convection heat transfer. Prereq: 5120 or consent of instructor.
5210 Classical Thermodynamics (3) Macroscopic thermodynamics with emphasis on First and Second Law analyses, equilibrium criteria, and thermodynamics of phase relationships. Prereq: 3330.
5220 Microscopic Thermodynamics (3) Thermodynamic properties, kinetic theory and statistical mechanics. Prereq: 5210.
5230 Special Topics in Thermodynamics (3) Pre-req: Consent of instructor.
5310 Intermediate Fluid Mechanics (3) Vector descriptions in fluid mechanics; derivation of basic equations; two dimensional free surface flows; viscous flows with emphasis on boundary-layer theory. Pre-req: 3410.
5410-20-30 Research in Mechanical Engineering (3, 3, 3) Design of experiments; data analysis; experimental investigation.
5510-20-30 Mechanical Engineering Design (3, 3, 3) Design of experiments; data analysis; application to complex mechanical systems. Prereq: 4631 or consent of instructor.
5601 Dynamics of Mechanical Systems (3) Computational techniques derived from Lagrangian mechanics and Eulerian analysis for application to complex mechanical systems. Prereq: 4631 or consent of instructor.
Aerodynamics of Compressible Fluids (3, 3) One-dimensional flow; waves, small-perturbation theory, slender body theory; similarity methods, method of characteristics. Prereq: 4210 for 5210, and 5210 for 5220.

5240 Dynamics of Viscous Fluids (3) Equations of viscid fluid flow; laminar and turbulent flow; transition; separation; boundary layer theories; exact and approximate solution methods. Prereq: Mechanical Engineering 5310 or equivalent.

5250 Introduction to Hypersonic Flow (3) Slender body flow, similitude; Newtonian theory; blunt body inviscid flows, shock diamonds, free molecule and rarefied gas flow. Prereq: 5240.

5260 Selected Topics in Aerodynamics (3) Transonic, supersonic, and hypersonic flow theories. May be repeated. Maximum 9 hrs.

5270-80-90 Aerospace Ground Test Facilities (3, 3, 3) Atmospheric models and similarity considerations. Aerodynamic test facilities including wind tunnels, shock tubes, hotshot and ballistic ranges; propulsion test facilities; rocket engines. Space environment. Theoretical and practical considerations of space environment test facilities. Prereq: 5240, Mechanical Engineering 5130 and 5230.

5310 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics, thermodynamics and transport properties of gas plasmas; governing equations and applications. Prereq: 4220 and Mathematics 4710.

5340-50 Atmospheric Entry (3) Motion and heating along ballistic and lifting trajectories; dynamic stability; heat protection systems. Prereq: 5220. Recommended: 5240.

5440-50 Transonic Flow (3, 3) Theoretical and experimental aspects. 5440—Nature of flow at transonic speeds and delineation of specific problems at the nonlinear nature of flow, strong viscous interaction, development of small disturbance equations and similarity parameters, shock-wave transonic flow and assumption of irrotational motion, solution techniques. 5450—Shock-wave boundary layer interaction and consequences, design of shock-free flows, wind tunnel testing at transonic speeds, interference problems. Prereq: 5220 or equivalent.


471-91 Experimental Aerospace Engineering (3, 3) Experimental methods and measurements of force, length, light, temperature, pressure, transport rates and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.

5100 Airplane Performance (3) Introduction to airfoil and wing characteristics, drag, propellers; static performance and maneuvers; theory and design of control surfaces, propulsion systems.

5000 Thesis (1-15) P/NP only, E.

5002 Non-Thesis Graduation Completion (3-18) 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 Fundamentals of Aerodynamics (3) Kinematics and dynamics of perfect fluids; potential flow about a body; conformal mapping; hodographs. Prereq: 4220 or Mechanical Engineering 5310, Mathematics 4250.

5120 Experimental Methods in Fluid Mechanics (3) Experiments with laboratory equipment: hot wire anemometry and turbulence measurements, flow visualization, wind tunnel tests (supersonic and hypersonic), wind tunnels, boundary-layer measurements. Prereq: 4210-20-30 or Mechanical Engineering 5310.

5150-60-70 Air Vehicle Aerodynamics and Performance (3, 3, 3) Application of aerodynamics to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic flight regimes. Aerodynamics of jet thrust, drag, lift, and altitude. Propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 4250.

5602 Computer Aided Mechanical Design (3) Application of matrices and computational techniques in the static and dynamic analysis and redesign of mechanical and thermal systems. Prereq: 5601 or consent of instructor.

5610-20-30 Experimental Stress Analysis (3, 3, 3) Theory of elasticity; experimental methods; photoelasticity, strain gages, lacquer coatings.

5640-50-60 Advanced Machine Design (3, 3, 3) Design of bearings, gears, shafting; lubrication.

5690 Vibrations of Mechanical Systems (3) Free and forced vibration of single and multiple degree of freedom systems; linear and nonlinear. Prereq: 3630.

5710 Metal Machining (3) Analytical approach to machines of machining. Basic phenomena—plastic flow, fractures, friction and wear. Prereq: 3650, 3440, and Metallurgical Engineering 2110.


5810-30-50 Rocket Propulsion System (3, 3, 3) Rocket propulsion fundamentals. Chemical, electric and nuclear propulsion systems.

5840-50-60 Turbomachinery Systems (3, 3, 3) Design and analysis of turbomachinery components. Prereq: First year graduate standing and consent of instructor.

5870 Dynamic Modeling and Simulation (3) Modeling physical systems including mechanical, thermal, hydraulic, pneumatic and electromechanical systems. Techniques for experimentally determining system parameters. Analog and digital computer simulation techniques. Prereqs: 3650, 4420, and Aerospace Engineering 3511.

5900 Selected Engineering Problems (3-9) Selected problems in mechanical engineering to fulfill requirement of Problems Program. Enrollment limited to students in Problems Program. Prereq: Consent of advisor. May be repeated. S/NC only.

5950 Seminars (1) All phases of mechanical engineering, including reports on recent research at The University of Tennessee, Knoxville. May be repeated. S/NC only.

5990 Special Topics in Mechanical Engineering (1-3) May be repeated.

6000 Doctoral Research and Dissertation (3-15) May be repeated. Limited to students in Problems Program. Prereq: Registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. 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.

6110-20 Advanced Topics in Fluid Mechanics and Heat Transfer (3, 3) Advanced theory and applications of fluid mechanics and heat transfer, natural convection, two-phase flows, high speed reacting and non-reacting flows, advanced boundary layer techniques. Prereq: Consent of instructor.

6130-40 Advanced Radiation Heat Transfer (3, 3) Fundamental theory of radiation heat transfer; characteristics of luminous flames and nonuniform gas flow; scattering by planetary atmosphere. Prereq: Consent of instructor.
6910 Advanced Topics in Gasdynamics (3) Selection of topics based on particular interests of students: nonequilibrium transport phenomena, radiation gasdynamics, nonequilibrium gasdynamic flows, advanced kinetic theory, perturbation techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

**Nuclear Engineering**

**MAJOR**

**DEGREES**

Nuclear Engineering

M.S., M.E., Ph.D.

**Professors:**

P. F. Pasqua (Head), Ph.D. Northwestern, P.E.;
H. L. Dodder, Ph.D. Nuclear Engineering, P.E.; J. B. Fuscelli, Ph.D. Georgia Institute of Technology; T. W. Kerlin, Ph.D. Tennessee; J. T. Mihalazko, Ph.D. Tennessee; P. Perez, Ph.D. Madrid (Spain); H. C. Roland, Ph.D. Tennessee; P. N. Stevens, Ph.D. Northwestern, P.E.

**Associate Professors:**


The Department of Nuclear Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with specialization in nuclear dynamics, nuclear reliability and risk, radiation transport, thermal hydraulics, and core analysis.

**MASTER OF SCIENCE PROGRAM**

A graduate program leading to a degree of Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program. The student must complete a program of study of 45 quarter hours 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, statistics or computer science.
3. A master's thesis which demonstrates research or design capabilities.
4. Final examination covering the thesis and graduate coursework.

An alternate program is available for the Master of Science degree which involves engineering practice rather than a thesis. The student may select a Program of study which includes the following:

1. Thirty-six quarter hours of course work similar to the requirements for the regular Master of Science program (see above).
2. Twenty-four-quarter hours of Nuclear Engineering 5980. 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.
3. Final examination covering graduate coursework, 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 to those graduates with an accredited engineering degree or one which satisfies A.B.E.T. 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). Documentary 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 independent 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 math, computer sciences, 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 or physics, and present at least a B average. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, and physics. At the same time, all candidates will be required to demonstrate special competence in nuclear design.

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 research.
3. A minimum of 45 quarter hours in nuclear engineering courses numbered 5000 and above (or the equivalent), with 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 undergraduate 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.
adjoint flux. Prereq or coreq: 4110 or equivalent. F, W, Sp


4710 Energy Transport (4) Development of differential and integral energy conservation equations; conductors, convection, and radiation heat transfer; applications to nuclear reactor fuel elements and heat exchangers. Prereq: 3730. F

4720 Reactor Thermal Design (4) Hydrodynamics and heat transfer in boiling systems; boiling crises; fuel element thermal design, steam generator design. Prereq: 4710. W

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. Sp

4810 Radiation Shielding (3) Types of radiation sources, gamma ray and neutron attenuation, biological effects of radiation, shield design. Prereq: Physics 3730, Mathematics 4550. Sp

4820 Reactor Kinetics and Controls (3) Derivation of kinetic equations; basic kinetic parameters; transient response with feedback; control and protective systems. Prereq: 4110. F

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. F

4930 Nuclear Fuel Management (3) Discussion of problems associated with processing of nuclear materials; fuel cycle analysis; burnup calculation. Prereq: 4120. W

5000 Thesis (1-15) P/NP only. E

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. E

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 analysis. Prereq: 4720 or equivalent. Mathematics 4710, 4550. F, W, Sp

5210 System Dynamics (3) Transient analysis, Laplace transforms, frequent response, stability (linear and non-linear), and sensitivity analysis by state variable methods. Dynamic analysis of distributed systems. Prereq: Consent of instructor. F

5220 Reactor System Dynamics (3) Application of methods of general system dynamics to reactor systems. Modeling of neutron and non-neutron processes. Dynamics, stability, and control of zero power reactors and power reactor systems. Prereq: 5210, 4130 or equivalent. F


5410 Nuclear Fuel Cycle Analysis (3) Alternative fuel cycles, symbiotic reactor systems and appropriate reactor systems; resource utilization; potential growth rates and system design considerations. Impact of selecting alternative systems from technical and economical viewpoints. Prereq: 4130 or equivalent.

5420 Reprocessing and Waste Disposal (3) Basic processes related to solvent extraction of nuclear fuel isotopes. Reprocessing of light water reactor and advanced reactor fuels. Disposition of radionuclides: reprocessing, site selection and environmental effects. Prereq: 4130 or equivalent. F, W, Sp


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: 4130. F


5810 Fundamentals of Fusion Physics and Engineering (3) Basic physics of fusion plasmas and description of fusion engineering problems. Plasma properties; collision processes; electromagnetics; plasma confinement geometries; kinetic theory; fluid equations; plasma equilibria, transport, and stability; plasma heating and fueling; confinement experiments; fusion reactor requirements; main reactor components; and fundamentals fusion engineering problem area. F

5820 Plasma Engineering (3) Integration of plasma physics models, fusion engineering design criteria, and fusion technology constraints into design of fusion plasma experiments and reactors. Requirements of fusion reactors; particle, momentum, and energy balances; burn dynamics; power balance; fuel cycles; heating and fueling requirements; plasma wall interactions; and simulation of various fusion reactor plasmas. Prereq: 5810. W

5830 Fusion Technology (3) Engineering problems associated with fusion reactor design; vacuum and magnets systems; materials and irradiation; plasma heating, fueling, and impurity control; first wall, blanket, shield, and neutronics; electrical systems; maintenance, environment; and review of major reactor design studies. Prereq: 5820. Sp

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. Prereq: 6820. Sp

6100-20-30 Selected Topics in Reactor Theory (3, 3, 3) Transport theory; control rod theory, and perturbation theory. Selected topics from literature. Prereq: Consent of instructor. F, W, Sp

6140 Radiation Shielding (3) Advanced topics in radiation shielding. Monte Carlo techniques and space radiation problems. Natural space radiation; energy-source radiators, dose conversion, probability. Selected neutron, gamma, and space radiation shielding problems. Prereq: Consent of instructor. Sp

6410 Selected Topics in Nuclear Systems Reliability Engineering (3) Advanced state-of-the-art topics in nuclear systems reliability engineering and risk assessment. Prereq: 5330 or consent of instructor.

6510 Nuclear Reactor Noise Analysis (3) Modern system theoretical methods for evaluating reactor performance descriptors from operating data. Prereq: 4610 and Electrical Engineering 5740 or equivalent.

6710 Two-Phase Flow and Heat Transfer (3) Pool boiling and flow boiling; hydrodynamics of two-phase flow, boiling crises, two-phase instabilities. Prereq: 5130 or equivalent. Su

6810 Plasma Engineering II (3) Continuation of 5820. Detailed modeling of plasma breakdown, start up, burn dynamics, heating and fueling, plasma wall interactions, disruptions, current drive, and stability and control. Prereq: 5820. F

6820 Fusion Reactor Design (3) Basic plasma performance requirements for fusion power systems; engineering and technological constraints and requirements; integration of physics, engineering, and technological factors to determine fusion reactor parameters. Prereq: 6810. W

6830 Special Topics in Fusion Engineering (3) Selected advanced topics in plasma engineering and fusion reactor engineering and technology. Different subject matter each quarter. May be repeated with consent of department. Prereq: 6820. Sp
The College of Home Economics offers two graduate degrees, the Master of Science and the Doctor of Philosophy. The Ph.D. degree in Home Economics is offered in three areas: interdisciplinary, food science, and nutrition. The M.S. degree program has seven major or minor areas. Both thesis and non-thesis options are available.

**Programs Leading to the Degree of Master of Science**

**Thesis Option:**
- Child and Family Studies
- Consumer Studies and Housing: Public Policy
- Interior Design and Housing
- Food Science
- Food Systems Administration
- Nutrition
- Textiles and Clothing

**Minor area(s) of study**
- Minimum of 12 hours of 5000 courses
- Total 45 hrs

**Non-Thesis Option:**
- Minimum of 96 quarter hours in the base area.
- Interdisciplinary option, minimum 36 hours, may be included in the 96 hours presented for the degree.

**Doctoral Program**
- The doctoral program in Home Economics includes three options of study: interdisciplinary, food science, and nutrition. The doctoral program is available in all departments in the College.

**Interdisciplinary Option:** The interdisciplinary option of the Doctor of Philosophy degree in Home Economics provides for advanced graduate study with an approach that focuses on the development, integration, and application of knowledge to innovative solutions of the multi-level problems of society. A student in the interdisciplinary doctoral program is in the relatively unique position of having a number of alternatives available which are developed as a function of the student’s creativity within the general framework.

**Individual and Family Behavior** (base department of Child and Family Studies):
- 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.

**Physiological Development and Well-being** (base department of Nutrition and Food Sciences):
- Physiological response to nutrient intake
- Improvement of nutritional status through informed community action
- Cultural, economic, and technological influences on food selection.

**Environmental Factors** (base department of Textiles, Merchandising, and Design or Nutrition and Food Sciences):
- Design, space planning, housing, food service systems, clothing, and textiles as they relate to human needs
- Cultural, sociological, psychological, and economic change
- Technological developments
- Aesthetics in improving the quality of the environment.

**Other Requirements:**
- Written comprehensive examination.
- Doctoral research and dissertation:
  - Nutrition, 36 hours
  - Food Science, 36 hours
  - Interdisciplinary option, minimum 36 hours
- Final oral examination.

**Major and Minor Areas**
- Nutrition
- Food Science
- Consumer Studies and Housing: Public Policy
- Child and Family Studies

**Minor Area(s) of study**
- Minimum of 9 hours in one minor area
- Written comprehensive examination is required.

**Non-Thesis Option:**
- Minimum of 30 hours of 5000 and 6000-level courses is required; these hours are to comprise a related sequence of courses which support the student’s program and may be drawn from any unit within the University. A minimum of 9 hours must be taken outside the College, and a minimum of 27 credit hours within the College. A minimum of 30 hours at the 5000-6000 level is required. Students must also take a 3-hour course in research methods or statistics. The thesis option requires 24 credit hours in the base area, including 9 hours of thesis. The non-thesis option requires 21 credit hours in the base area, including 6 hours of practicum.

**Required Courses:**
- A minimum of 96 quarter hours in the base area.
- Interdisciplinary option, minimum 36 hours, may be included in the 96 hours presented for the degree.

**Other Requirements:**
- Oral examination.
- Thesis option requires 24 credit hours in the base area, including 9 hours of thesis.
- Non-thesis option requires 21 credit hours in the base area, including 6 hours of practicum.

**Graduate Studies in Home Economics**
- Provides students with a broad-based education in the home economics field with an emphasis on the development of critical thinking skills.
- Prepares the student for teaching, research, and public service in colleges and universities or managerial positions in government, business, and industry.

**Course Requirements:**
- A minimum of 3 hours of a 5000 course in Textiles and Clothing

**Course Work:**
- A minimum of 9 hours of 5000 courses

**College of Home Economics**

Nancy Belck, Dean
Jay Stauss, Associate Dean, Graduate Studies and Research
Fran Andrews, Assistant Dean, Undergraduate Studies
Karl Weddle, Assistant to the Dean

Graduate studies in Home Economics prepares the student for teaching, research and public service in colleges and universities or managerial positions in government, business, and industry.
Consumers' Economic and Social Well-being (base department of Child and Family Studies; Textiles, Merchandising, and Design; or Nutrition and Food Sciences):

- relationship between family structure and decision-making processes in the use of human resources.
- effects of social macro- and microeconomics and political development on consumption patterns and other behavior.
- community programs to meet the socioeconomic needs of consumers.

1. Home Economics 6110-20; prerequisite is 5210.
2. Twenty-four to 36 hours from two areas in the College of Home Economics.
3. Fifteen to 24 hours in collateral or supporting courses in other colleges in the University including courses to give sufficient competence in statistics and research methods needed for dissertation research.
4. Doctoral research and dissertation based on a problem within the interdisciplinary concentration.

Food science option:
- Twelve hours of research methods from Food Science 5510 or 5520 or Food Systems Administration 5210; 6 hours from Food Science 5510-20-30-40, 6110, Food Systems Administration 6110, and Zoology 5350 or equivalent.
- Twenty-four hours in 5000- and 6000-level courses in food science or in food systems administration.
- 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.
- Minimum of 4 hours of credit in doctoral seminar.

Nutrition option:
- Thirty hours of 5000 or 6000 courses in nutrition exclusive of research and Zoology 5350 or equivalent.
- 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.
- Minimum of 4 hours of credit in doctoral seminar.

GRADUATE PROGRAMS FOR HOME ECONOMICS EXTENSION
Graduate programs at both the doctoral 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 agriculture extension education as a collateral area. Additionally, four-week courses are offered in February each year for students particularly interested in home economics extension.

ACADEMIC COMMON MARKET
The ACM is an interstate agreement among southern states for sharing academic programs. Through this agreement students from participating states are eligible for in-state tuition. Potential of half students enrolled in the doctoral program in Home Economics at The University of Tennessee, Knoxville, who are residents of Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, South Carolina, or West Virginia are eligible to participate in the Academic Common Market. Those who plan to enter a Master's program in Food Systems Administration in the College of Home Economics and are residents of Arkansas, Kentucky, or West Virginia are also eligible. Those who plan to enter the Master's program in Nutrition (including public health nutrition) and are residents of Alabama, Arkansas, Georgia, Kentucky, or Virginia are eligible. Those who plan to enter the Master's program in Consumer Studies and Housing: Public Policy and are residents of South Carolina are eligible.

APPLICATION FOR ADMISSION AND FINANCIAL AID
Requirements for admission to The Graduate School are on page 10 of this catalog. A college of Home Economics application and three Graduate School Rating Forms are required. These may be obtained at the Dean's Office, Jessie Harris Building, or written:

Jay Strauss, Associate Dean for Graduate Studies and Research
College of Home Economics
The University of Tennessee
Knoxville, Tennessee 37996-1900
Phone: (615) 572-5231
Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for application to all programs. Additionally, Interior Design majors require a portfolio.

Departments of Instruction

Child and Family Studies

MAJORS
Child and Family Studies
Consumer Studies and Housing: Public Policy
Home Economics

DEGREES
M.S.
M.S.
Ph.D.
Ph.D.

Professors:
N. Bick (Dean), Ph.D. Michigan State;

Associate Professors:
D. B. Eastwood, Ph.D. Tufts; J. Strauss (Associate Dean and Interim Head), Ph.D. Washington State; S. Twardos, Ph.D. Kansas.

Assistant Professors:
J. Allen, Ph.D. Purdue; C. Buehler, Ph.D. Minnesota; A. Cox, M.S. Tennessee; G. Eastman, Ph.D. Cornell; J. Kidwell, Ph.D. Purdue; G. Peterson, Ph.D.; Brigham Young; K. G. Winstead (Assistant to the Dean), Ph.D. Tennessee.

4220 Conserving Time and Energy in the Home (3) Application of management principles to home-making activities; evaluation of equipment, work centers and techniques; analysis of time and energy demands. Adaptations for the handicapped.

4260 Adult Development and Aging (3) Adult life in our society. Adjustment to internal and environmental changes through middle and aged years.
able-bodied and handicapped. Survey of literature. Current trends and methods of research. Prereq: 4220 or consent of instructor.

5170 Consumer Economics (3) Consumer function in society; consumer markets; government action relating to consumers; factors affecting prices of consumer goods.

5174 Public Consumption (3) Relationships between consumers and public sector. Market system failures from consumer perspective. Government revenues and expenditures in terms of their impacts on consumers. Effects of consumer oriented public programs. Prereq: 5170 or consent. Sp

5180 Family Financial Consultation (3) Analysis of family expenditure patterns, common financial difficulties, avenues by which families are assisted. Field experience with consumer consulting services. Prereq: 4210, 4830 or 5170. Sp

5190 Standards in Consumer Protection (3) Product and performance standards in consumer protection. Theoretical and operational questions relating to standards: analysis of costs and benefits to consumers. Prereq: 4830, 5170 or consent of instructor.

5210 Theories of Child Development (3) Prereq: 4350 or equivalent. W

5220 Family Life Programs (3) School and community programs in family life: theory and evaluation; students concentrate on type best suited to their experience and future professional orientation. Prereq: 3 hrs child development, 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 psychological theory and research. W

5410 Advanced Family Relationships (3) Problems in modern family life: individual adjustments, group relationships. Prereq: 3515, 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. W

5450 Conceptual Frameworks for the Family (3) Theoretical perspectives for understanding families. Exploration and applications of frameworks on theoretical and research levels. Historical to contemporary developments in family studies. Prereq: 5410 or consent of instructor. Sp

5510 Survey of Research in Child and Family Studies (3) Research literature: locating, abstracting, reporting research studies. Prereq: 3515 or 4430 or consent of instructor. W

5520 Research Methods in Child and Family Studies (4) Research procedures in child and family behavior; basic methodology of behavioral sciences. Recommended as prerequisite to beginning thesis work in this area. Prereq: 9 hrs child and family studies. 3 lectures and 1 discussion.

5540 Learning in Preschool Programs (3) Description, analysis and evaluation of various preschool models and programs. Prereq: 6 hrs in child and family studies or preschool education. Sp

5550 Supervision in Preschool Programs (3) Guidance of students working in nursery school and day care centers. Preparation of students for 3 seminar discussions, individual conferences, and various evaluation techniques. Prereq: 5540, 3 hrs and 1-2 hr lab.

5610 Theories of Management in the Family Environment (3) Fundamental management concepts, development and application to current family situations.

5620 Nursery School Administration (3) Organization and operating schools and play groups for pre-school children. Housing, staff, schedules, programs, financing. Prereq: 4110 or equivalent.

5630 Seminar in Infant Development (3) Theory and research relating to development during infancy. Prereq: 3220.

5640 Teaching Child and Family Studies (5) Seminar and practicum in techniques for teaching child development and family relationships. Prereq: Consent of instructor. S/N only.


5720 Consumer Protection (3) Regulatory agencies, standards, information disclosure and other consumer protection legislation. Assumptions involved in these efforts and relative success of different strategies. Prereq: 5170, 5190, or consent of instructor.

5800 Problems in Child, Family and Consumer Studies (1-3) Advanced study of child development and family variables in family planning programs. Internship in planned parenthood programs and clinics. May be repeated. Maximum 9 hrs.

5850 Children's Effects on Parents and Marriage (3) Theory and research about how children change parents and influence marital relationships. Prereq: 4430 or consent of instructor.

5900 Seminar in Child and Family Studies (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5910 Research Seminar (1-2) Required 1 hr for M.S. students, 2 hrs for Ph.D. students. S/N only. E


6250 Advanced Topics (3) Individual study and group discussion of current problems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6310 Individual and Family Development—Physiological Determinants (3) Family members' physiological potential, development, and status. Family's contribution to members' physiological potential for growth and development and to realization of human potential. Advanced child-parent and family studies, 4 hrs nutrition, 4 hrs physiology, or equivalent. Sp

6320 Individual and Family Development: Cognitions (3) Processes through which an individual learns to recognize their world. Cognitive processes involved in development across life span, focus on research findings and methodology. Prereq: 5210, 5530, 5630, or equivalent. W

6330 Individual and Family Development: Socialization (3) Processes of socialization throughout life cycle. Family as primary socializing agent. Prereq: 5210, 5410, or equivalent.

6410 Theory Construction in Family Studies (3) Process and application of theory construction in contemporary research areas and family studies. Emphasis on understanding, criticizing and constructing theoretical models based on research findings. Prereq: 5410 or consent of instructor.

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: 5210, 5540 or equivalent.

6510-20 Applied Behavior Analysis in Natural Settings (3, 3) Individual supervision in application of applied behavior analysis in natural settings. Prereq: 5420 or consent of instructor.

6710 Elements of Consumer Choice (3) Analysis of consumer decision making, theory 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: 5170 or consent of instructor.

6730 Urban Consumers (3) Focus on how consumers function in an urban economy. Urban growth and change, use of consumer oriented public programs, relationship between consumers and local government. Prereq: 5170 or consent of instructor.
and minerals in metabolism. Not for graduate credit to departmental majors. Prereq: 3130 or equivalent. Sp, Su.

4000 Origin of Food and Foodways (3) Food origin and development of individual group foodways. Prereq: 8 hrs social science or humanities. F, Su.

4020 Introduction to Sensory Evaluation of Foods (3) Sensory evaluation methods. Prereq: 4010 or 6 hrs of food technology and science; Plant and Soil Science 3610 or equivalent. 2 hrs and 1 lab.

4040 Food in Contemporary Society (3) Consumers' options, responsibilities, and potential influence with respect to food supply. F, Su.

4050 Food Preservation (3) Application of basic principles and research findings to food preservation in homes. Prereq: 3010 or 610. 4 hrs microbiology and 3150 or equivalent recommended. 2 hrs and 1 lab.

4110 Introduction to Nutrition Research (3) Nutrition principles and laboratory experiences involving small animals. Prereq: 3160. 2 hrs and 1 lab. Sp.

4130 Nutrition in Disease (4) Nutrition problems in diseases influenced by diet. Prereq: 3160. 6.5 hrs. Su.

4131 Clinical Experiences in Dietetics (1) Planned clinical experiences applying principles of nutrition in dietetics. Coreq: 4130. Open only to students in the coordinated undergraduate program in dietetics. Su.

4140 Nutrition in Disease II (3) Interdisciplinary lectures and discussions on the metabolic processes of normal and diseased tissues and organs. Not for dietetic majors. Prereq: 4130. Designed for senior students in the coordinated undergraduate program in dietetics. F.


4180 Environmental Effects on Nutrition (3) Effect of natural and synthetic food toxins, drugs both social and therapeutic, and extreme environmental conditions on nutrient availability, utilization, and requirements of humans. Prereq: 6 hrs natural science.

4190 Diet and Drug Therapy (3) Effect of drug therapy on absorption, utilization and toxicity of drugs. Prereq: 3160 or consent of instructor. Su.


4220 Food and Lodging Information Systems (3) Design of information systems for decision making in hotel-motel complex; computer application in hospitality management. Prereq: 3210; College 1410; Economics 2130.

4240 Food Systems Personnel Development (3) Development of training programs and personnel management policies for food systems personnel. Prereq: Economics 3420 or Psychology 4460 or consent of instructor.

4250 Food Systems Managerial Cost Control (3) Cost analysis for food and beverages; use of financial statements for decision making in food service systems. Prereq: 3220. Sp.

4260 Food and Lodging Physical Plant Planning and Maintenance (4) Fundamentals of mechanical systems and building components of food and lodging physical plant; organization and principles of properties management. Prereq: 4210. 5 hrs and 1 lab.

5000 Thesis (1-15) P/NP only. E.

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/C only. E.

5010 Food Texture (3) Classification of foods according 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. F.

5020 Food Sensory Testing Methods (3) Principles and methods of food sensory testing and their application of methods: analysis of sensory data. Prereq: 4010; Plant and Soil Science 3610 or equivalent. 2 hrs and 1 lab.

5030 Advanced Experimental Food Science (3) Application of research methods to individual problems. Prereq: 5010-20 or consent of instructor. Sp.

5040 Food Behavior of the Individual (3) Development of and changes in choices of food and food habits of individuals. Prereq: 4000. 3 hrs of nutrition or consent of instructor. Sp or Su.

5050 Foodways in the United States (3) Current foodways of selected subcultures in United States and historical in origin for their development. Prereq: 4000. 3 hrs of nutrition, or consent of instructor. W, Sp.

5060-65 Advanced Food Science (3, 3) Biochemical and biophysical interactions in food. Prereq: 4010; 3150 or equivalent, or consent of instructor. W, Sp.

5070 Carbohydrates and Fats in Relation to Food Science (3) Physical and chemical characteristics of the fats of milk, eggs, flour, and meat with emphasis on their behavior in food. Prereq: 4010; 3140-50 or equivalent.

5100 Advanced Physiological Chemistry (4) Bioenergetics and related metabolism of nutrients. Prereq: 3140 or equivalent. 3 hrs and 1 lab. F.

5105 Advanced Physiological Chemistry (3) Nutritional factors in relation to body fluids, gas transport, and endocrine function. Prereq: 3140. W.

5110 Community Nutrition (3) Nutrition problems and experiences in supervised field work. Prereq: 3160 and consent of instructor. 3 labs. F.

5115 Community Nutrition (3) Observations and participation in nutrition programs of local and state agencies. Prereq: 5110 and consent of instructor. 3 labs. W.

5120 Community Nutrition (3) Nutrition programs of state and federal agencies; preparation of material for nutrition education; supervised field work. Prereq: Consent of instructor. Tu, W, Th.

5125 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of internship to be selected in consultation with instructor. Prereq: 5115 and consent of instructor. S/N/C only. Sp.

5130 Mental Retardation or Other Developmental Disabilities of Childhood (3) Multidisciplinary core course required of all full-time students in training at Child Development Center, UT Center for the Health Sciences, Memphis. Prereq: Consent of department head. F, W, Sp.


5140 Experimental Methods in Nutrition (3) Use of small animals in experimental nutrition. Prereq: 3140-50-60, 3140. 2 hrs and 1 lab. F.


5160 Physiological Bases for Diets in Disease (3) Developments in dietary treatment of disease in which nutrition plays a major role. Prereq: 3160 or equivalent. Su.


5170 Survey Methods in Human Nutrition (3) Food consumption, food practices and nutritional status of population groups. Prereq: 5150-55. 2 hrs and 1 lab.

5175 World Food Supply and Human Nutrition (3) Food supplies and their implications related to human nutrition throughout world. Regional, national and international agencies concerned with food and nutrition problems. Prereq: 5150-55. Sp.

5180 Nutrition and Aging (3) Nutritional problems of aging individual, nutritional requirements, dietary intakes, and effect of nutrition on rate of biological aging. Prereq: Consent of instructor. W.

5210-20 Experimental Quality Food Study (3, 3) Analysis of food production, holding environment, and service problems related to quality of food prepared in volume. Management resources. Prereq: 3210, 3220, or consent of instructor. F, Su.

5220 Methods of Food Systems Research (3) Research methods applicable to food systems administration. Prereq: 3210 or equivalent. W, A.

5240 Experimental Design of Food System Facilities (3) Environment and design of food service environments. Prereq: 4120. W.

5250 Food Systems Evaluation (3) Management resources in food systems. Standards for control. Prereq: Consent of instructor. F.


5270 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: 3220 or consent of instructor. W, A.

5310 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 consent of instructor. Sp.

5340 Foods and Nutrition: Physicochemical Principles (2) Thermodynamics; physicochemical properties of proteins, carbohydrates and lipids; chemistry of collodial states; chemical kinetics; specialized kinetics of enzymatic processes. Prereq: 3140 or equivalent. Sp, A.

5350-60 Research Techniques (3, 3) Human metabolic balance experiments. Analytical methods for assessment of food and biological materials. Prereq: 5140. 3 labs. A.

5380 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor.

5706 Current Programs and Trends (1-3) Recent advances in nutrition and implications for professionals. Prereq: Consent of instructor. May be repeated.

5800 Problems in Nutrition and Food Sciences (1-3) Advanced study in nutrition and food sciences. Prereq: Consent of instructor. May be repeated.

5900 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/N/C only.

5910 Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nursing 5900, Physical Education 5900, and Social Work 5900.) S/N/C only.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.

6010 Food Dispersions (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5030.
**Textiles, Merchandising, and Design**

**MAJORS**

Textiles and Clothing  
Interior Design and Housing  
Consumer Studies and Housing  
Public Policy  
Home Economics

**DEGREES**  
M.S.  
Ph.D.

**Professors:**  
R. L. Blakemore, Ph.D. Florida State; J. O. De Jonge (Head), Ph.D. Iowa State; E. C. Goswami, Ph.D. Pennsylvania State.

**Associate Professors:**  

**Faculty Associate:**  
C. L. Vigo, Ph.D. Tulane.

**Assistant Professor:**  
C. E. Cox, Jr., Ph.D. Tennessee.

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**Interior Design and Housing**

A student's course of study may include intensive training in interior design beyond an undergraduate program, behavioral design research, history and preservation of interior architecture and/or housing.

**ACQUISITIONS AND EXHIBITIONS**

Prospective graduate students pursuing a degree in advanced interior design should submit a portfolio of their undergraduate studio work to the department. This portfolio may include slides or original work.

**4320 Family Housing Problems (3)** Housing requirements of families. Reading and judging housing 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.

**4450-51 Advanced Interior Design (6,6)** Intensive interior design experiences: complex design problems utilizing systematic design methodology. Project types: multi-family housing, commercial and institutional environments, or complex working environments. Analysis, methodology, and critique from area professionals. Prereq: 3452 for 4450. Courses taken in sequence or consent of instructor.

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**College of Home Economics/Textiles, Merchandising, and Design**

**4020-30 Food and Sociocultural Change (3, 3)** Critical evaluation of factors and interrelationships affecting food intake and consumption patterns. Must be taken in sequence. Prereq: 5400 or 5500, or consent of instructor. F, W

**6110 Proteins and Amino Acids (3)** Lectures, reports, and discussions. Prereq: 5400 or 55. Sp, A

**6120 Mineral Metabolism (3)** Lectures, reports, and discussions. Prereq: 5150-55. Sp, A

**6130 Lipid Metabolism (3)** Lectures, reports, and discussions. Prereq: 5150-55. Sp, A

**6140 Vitamin Metabolism (3)** Lectures, reports, and discussions. Prereq: 5150-55. A

**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: 4240, 5230 or consent of instructor. Sp

**6220-30 Quantitative Methods to Control Resources in Food Service Systems (3, 3)** Interrelations of resources and evaluation of efficiency and effectiveness in food service systems. Prereq: 5230 or consent of instructor. Taken in sequence. Credit allowed for 6220 contingent upon completion of 6230. F, A

**6310 Advanced Topics (3)** Comprehensive individual study and group discussion of topics related to current problems in nutrition and food science. Prereq: Consent of instructor. May be repeated. S/NC only. E

**5040 Seminar In Design (3)** Intensive reading, discussion and critical evaluation of twenty-first-century design concepts, persons, motivation, and creative components. Prereq: 6 hrs psychology. Hours and credit arranged. Prereq: Consent of instructor. May be repeated. S/NC only.

**5901 Seminar (1-3)** May be repeated. S/NC only. E
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>5150</td>
<td>Principles of Design Analysis (3)</td>
<td>Application of flat 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.</td>
<td>W</td>
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<tr>
<td>5160</td>
<td>Review of Literature (3)</td>
<td>Intensive survey and evaluation of recent literature; implications for further research.</td>
<td>F</td>
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<tr>
<td>5170</td>
<td>Social, Psychological and Economic Aspects of Clothing (3)</td>
<td>Clothing as it relates to human behavior. Prereq: 6 hrs or equivalent from each of following areas: sociology, psychology, economics.</td>
<td>W</td>
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<tr>
<td>5180</td>
<td>Advanced Textile Economics (3)</td>
<td>Economic problems or problem areas of current importance in textile and apparel industries—production, consumption, and governmental policy. Prereq: 3420, 6 hrs economics or consent of instructor.</td>
<td>W</td>
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<tr>
<td>5220</td>
<td>Historic Textiles (3)</td>
<td>Development of textile industry in world; fibers used, design, and color.</td>
<td>F</td>
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<tr>
<td>5240</td>
<td>Practicum (1-9)</td>
<td>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.</td>
<td>F</td>
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<tr>
<td>5250-60-70</td>
<td>Problems in Textile Chemistry (4, 4, 4)</td>
<td>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. 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.</td>
<td>F, W</td>
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<tr>
<td>5310</td>
<td>Fashion Analysis (3)</td>
<td>Fashion as social and economic force; evolutionary theories of fashion operation.</td>
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<tr>
<td>5320</td>
<td>Problems in Historic Costume (3)</td>
<td>Variable flow of styles in relation to cultural determinants. Prereq: 3480 or consent of instructor. May be repeated. Maximum 9 hrs.</td>
<td>F</td>
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<tr>
<td>5610</td>
<td>Textile Processing (3)</td>
<td>Methods and mechanics of texturing continuous filament yarns, methods and mechanics of processing staple yarns, spinning system, composite yarns weaving, knitting, non-woven fabric formation. Prereq: Engineering Science and Mechanics 3311, Mathematics 2840. (Same as Polymer Engineering 5610.)</td>
<td>F</td>
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<tr>
<td>5700</td>
<td>Current Programs and Trends in Textiles and Clothing (1-3)</td>
<td>Pertinent developments and trends in textiles and/or clothing and implications for new types of programs, techniques and/or curricula approaches. Content and emphasis vary according to changes in field and needs of group serviced. Prereq: Consent of Instructor. May be repeated. Maximum 9 hrs.</td>
<td>F</td>
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<tr>
<td>5800</td>
<td>Problems in Textiles and Clothing (1-3)</td>
<td>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.</td>
<td>F</td>
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<td>5900</td>
<td>Seminar in Textiles and Clothing (1-3)</td>
<td>Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E</td>
<td>F</td>
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<tr>
<td>6010</td>
<td>Advanced Studies in Textiles and Clothing (3)</td>
<td>Independent analysis of major philosophies, theories, methods, and research. Prereq: 5160 or consent of instructor. May be repeated. Maximum 6 hrs.</td>
<td>F</td>
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<tr>
<td>6110</td>
<td>Selected Issues in Textiles and Clothing (3)</td>
<td>Advanced topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.</td>
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**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.

**6150 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.

**6160 Textile Flammability (3)**

Factors affecting textile flammability as consumer issue. Standards, regulations, test methods, economic impact. Prereq: 5120, 5160, 5250, or consent of instructor.

**6170 Physical Performance Behavior of Textile Structures I (3)**

Fundamentals of yarns and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.

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<tbody>
<tr>
<td>6190</td>
<td>Seminar in Textiles and Clothing (1-3)</td>
<td>Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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</table>
Aviation Systems

MAJOR
Aviation Systems

DEGREE
M.S.

Lead Professor:
M. A. Wright, Ph.D.

W. D. Wales.

Professors:
W. Frost, Ph.D.
Washington A. A. Mason, Ph.D.
N. M. Wu, Ph.D.
California Institute of Technology R. L. Young, Ph.D.
Northwestern

Associate Professors:
F. G. Collins, Ph.D.
California (Berkeley)
H. D. Kimberlin, M.S.
Tennessee.

Assistant Professors:
W. B. Baker, Jr., Ph.D.
Tennessee
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 a Bachelor's degree 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 hours field credit in each of the areas of research, development and administration, and electives which permit further specialization in 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, with evidence of ability to pursue and benefit from the program, and fulfill the University of Tennessee Graduate School minimum requirements:

1. 18 hours in the major field of aviation systems.
2. For the research and development area, Industrial Engineering 5700 and 5710; for the administration area, Economics 5030.
3. 6 hours of electives selected from the major field, engineering and/or the areas in item 2.
4. 9 hours in Aviation Systems 5000, Thesis, 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. 18 hours in the major field of aviation systems.
2. For the research and development area, Industrial Engineering 5700, 5710, and 5720; for the administration area, in Economics 5030, and Finance 5010-20.
3. 6 hours of electives in one of the areas in item 2.
4. 6 hours of electives in the major field, engineering and/or the areas in item 2.
5. Satisfactory completion of Aviation Systems 5100.
6. Satisfactory completion of a comprehensive final written examination on all course work submitted for the degree and defense of the project course paper.

The thesis program involves 45 quarter-hour credits minimum while the non-thesis program involves 51 quarter-hour credits minimum.

5000 Thesis (1-15) P/NP only. E

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 requirement analyses, types of developments and their projections. Prereq: Aerospace Engineering 5810.

5080 Collection and Distribution (3) Capabilities, 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 analysis, and model analysis 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 regulatory 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.


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 5810, 5820, and Industrial Engineering 5840.

Comparative and Experimental Medicine

MAJOR
Comparative and Experimental Medicine

DEGREES
M.S., Ph.D.

Joint Graduate Coordinating Committee

H. Kitchen (Chairperson); J. E. Fuhr; J. E. Lawler; R. L. Michel.

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of pathology, immunopathology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area.
and is especially useful for individuals with professional degrees. For the student with an undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this interdisciplinary program, which pools faculty resources from both veterinary and human medicine, is broadened by including members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophiliac Clinic, Birth Defect Clinic, Aberrant Metabolism Laboratory, and Histology and Oncology services.

For specific course listings please see College of Veterinary Medicine, page 31 and College of Medicine—Knoxville Unit, page 148 in this catalog.

ADMISSION REQUIREMENTS

General Requirements

Admission requirements of The Graduate School of UTK will apply. In addition, all applicants are required to furnish three letters of recommendation from individuals who are familiar with their scholastic or professional records.

Requirements for Admission to the Master of Science Degree Program

Applicants will be required to have a professional degree in one of the medical sciences (M.D., D.D.S., D.V.M.) or a baccalaureate degree with course work including biological, chemist, and mathematics through calculus, one year of physics, one year of basic biology plus an additional half-year of more advanced study in the field of biology including courses such as biochemistry, mammalian anatomy, histology, cell biology, or others that are appropriate for individuals aspiring to research careers in biomedical science.

Applicants for admission to the Master of Science degree program whose backgrounds include no formal training in the biomedical field beyond the baccalaureate degree will be required to present evidence of satisfactory performance on the Graduate Record Examination.

Requirements for Admission to the Doctor of Philosophy Degree Program

Applicants will generally be expected to have a Master’s degree in one of the biological sciences or a professional degree in one of the medical sciences.

Selected individuals having baccalaureate degrees with strong backgrounds in the physical and biological sciences may be admitted upon presenting evidence of satisfactory performance on the Graduate Record Examination.

Exceptions to the above requirements may be made at the discretion of the Admissions Committee if the minimal requirements of The Graduate School have been met. Applicants who are admitted to graduate programs but who are lacking in course requirements will be required to correct these deficiencies early in their graduate programs.

For additional information, see sections in this catalog on College of Veterinary Medicine and College of Medicine—Knoxville, or write to the Office of Research and Graduate Programs, P.O. Box 1071, Knoxville, TN 37901.

Ecology

MAJOR

Ecology

DEGREES

M.S., Ph.D.

D. L. Bunting, Chairman. Ph.D. Oklahoma State

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.

Research 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, the National Park Service, 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 that is truly unique. In addition, faculty research programs 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. Chemistry through organic, mathematics through calculus, and 4 quarter hours of ecology at the upper division level;
3. Applicants must be Ph.D. students.
4. 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 Chairperson, Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee 37996-1610.

ADVISORS

Advisors are selected from ecologists on the shared faculty of the University who have competence in the area in which the student expects to work. Entering students should consult early with the chairperson of the program on the choice of a faculty advisor who will become the chairperson 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). Ecology 5210-20-30 or approved equivalent 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 10.

A minor in ecology is available.

THE DOCTORAL PROGRAM

The requirements for this degree are in general the same as those of The Graduate School. The doctoral program must include Ecology 5210-20-30 or an approved equivalent and a minimum of 9 quarter hours of courses numbered above 5100. A student cannot enroll for dissertation until the research proposal has been discussed and approved by the doctoral committee. A foreign language is required.

Faculty


5000 Thesis (1-15) P/NP only. E.

5100 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Maximum 3 hrs.

5210 Principles of Ecology: Populations (3) Development of modern concepts in population biology: genetic structure, demography, reproductive strategies, growth and regulation of animal and plant populations; and interspecific interactions: predation, competition and coevolution. Prerequisite: 4 hrs of ecology at the upper division level and general genetics.


5230 Principles of Ecology: Ecosystems (3) Patterns, underlying factors, short and long-term dynamics, energetics and nutrient cycling of terrestrial, freshwater and marine ecosystems. Prerequisite: 5220.

5310 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and
5320 Implementation of Environmental Policy (3) Goals and problems of environmental legislation, especially National Environmental Policy Act; purpose, operation, and evaluation of environmental impact statements and similar multidisciplinary studies. Prereq: 5210 or 5310, or Environmental Engineering 4020.

5810 Environmental Toxicology (3) (Same as Biochemistry 5840.)

5640 Techniques in Environmental Toxicology (3) (Same as Biochemistry 5640.)

6000 Doctoral Research and Dissertation (3-15) P/NP only, E

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)

6431 Current Topics in Environmental Toxicology (1) (Same as Biochemistry 6431.) S/NC only.

Industrial and Organizational Psychology

MAJOR

DEGREES

Industrial and Organizational Psychology

M.S., Ph.D.

Committee:
J. M. Larsen, Jr. (Chairperson); W. H. Chalmin; H. D. Dewhirst; M. E. Gordon; R. T. Ladd; J. W. Lounsbury; M. C. Rush; J. E. A. Russell; R. O'Brien; M. S. Worman, Jr.

(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.

ADMISSION PROCEDURE

Applicants for admission should request forms and materials from both The Graduate School and the Chairperson, Industrial and Organizational Psychology Program, 413 Sticklely Center for Management Studies, Knoxville, Tennessee 37996-0545.

Two separate applications must be completed: one application for admission to The Graduate School (apply for major in "Industrial and Organizational Psychology") and one application for admission to the Industrial and Organizational Psychology program. Deadline: For fall entrance, all materials must be received by the Graduate Office no later than March 1 if financial assistance is desired. Standards: At least 9 quarters of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade point average of 2.9 or above is required, with no evidence of special weakness in mathematics and physical sciences.

Test scores on each section of the aptitude portion and the Advanced Psychology portion of the GRE are required. Customarily, those students admitted to the program have performed at or above the 69-79th percentile on the aptitude tests. (This corresponds to a raw score of approximately 600 on each of the tests.) The Psychology score will be used in making admission decisions, although special consideration will be given in the case of non-psychology majors.

THE MASTER'S PROGRAM

I. Course Requirements (Currently under review and subject to change for Fall 1984 entrants)
A. Management or Psychology 5170-80-90.
B. Statistics 5050-60-70 and 3 hours of applied psychometrics.
C. Eighteen hours of additional course work to be selected and passed from among the 5000-level course offerings in management and psychology [e.g., Management 5110, 5220, 5230].
D. Nine hours of Psychology or Management 5000 (Master's Thesis).

II. Program Requirements

A. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 or the 90th percentile on the GRE Advanced Test in Psychology.
B. The Ph.D. program requirements described below in sections II A, 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 (Currently under review and subject to change for Fall 1984 entrants)
A. Minimum course requirements:
   1. Management or Psychology 5170-80-90.
   3. Minimum of five 6000-level seminars to be selected from Psychology or Management 6250-60-70, and Management or Psychology 6380.
   4. 36 hours of Psychology or Management 6000.
B. Recommended electives:
   1. For preparation for advanced section (81) GRE: Psychology courses as appropriate.

*May be repeated for additional credit.

2. For students who require preparation in psychometrics: Applied psychometrics.

3. For students who require preparation for management: Management 5110, 5220, 5320.

4. For students who wish to pursue special research interests aside from their dissertation: Management 5220, 5260, Management or Psychology 6900.

5. Courses available in areas related to industrial and organizational psychology:
   a. Through College of Business Administration.
   b. Through College of Liberal Arts.
   c. Others as approved by advisor.

II. Program Requirements**

A. Attainment of a B average*** in Management or Psychology 5170-80-90.
B. Completion of an oral examination in general psychology within no more than two years of entry by attaining a score of 650 or the 90th percentile on the GRE Advanced Test in Psychology.
C. Completion of a comprehensive examination in scientific methodology before beginning the third year of study. This examination covers the following specific areas: statistics, psychometrics, experimental design.
D. Completion of a special comprehensive examination in the area of the student's major research and professional interest. A student is expected to take this examination by the end of twelve quarters. This examination may be repeated once, normally no later than six months after the first attempt, at the discretion of the student's doctoral committee.
E. 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 doctoral research and related topics, and must be passed at least four weeks prior to the awarding of the degree.
G. Maintenance of at least 3.0 grade point average.

Life Sciences

MAJOR

DEGREES

Life Sciences

M.S., Ph.D.

Coordinating Council:
W. H. Chalmin (Chairperson); Animal Physiology: H. G. Welch; Cellular and Molecular Biology: J. M. Becker; Environmental Toxicology: L. B. Bratton; Ethology: G. B. Burghardt; Plant Physiology/Biochemistry: R. W. Hotten; Reproductive and Developmental Biology: J. A. MacCabe.

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate programs which augment the programs of individual departments. The graduate program in Life Sciences supports studies and research in the following concentrations: animal physiology, cellular and molecular biology, environmental toxicology, ethology, plant physiology/biochemistry, and reproductive physiology.

**Any student in the doctoral program may be required to prepare a Master's thesis by the Industrial and Organizational Psychology Committee. This policy will be implemented by the committee at such time as a review of the student's record suggests that additional data on the qualifications for pursuing a Ph.D. are required.

***See program handbook for definition of a B average.
and developmental biology. Students interested in any of these areas should contact either the chairperson of Life Sciences or the director of the area of interest. Each concentration area is overseen by a committee and may have unique admission and graduate instructions. Each area has its own minimum hours required for graduation.

**GENERAL ADMISSION REQUIREMENTS**

1. A Bachelor’s degree with a major in a biological, behavioral or physical science.
2. GRE (aptitude) scores.
3. Three letters of recommendation.
4. Course work including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

**GENERAL PROGRAM REQUIREMENTS**

The program requirements are in general the same as those of The Graduate School. The Master’s program requires 45 hours of study approved by the student’s committee, a thesis, and a comprehensive oral examination. The minimum requirements for the doctoral program include at least 9 hours above the 6000 level, 36 hours of course work approved by the student’s committee, a comprehensive examination, a doctoral dissertation, and a final examination. Individual concentration areas may have additional requirements.

**AREAS OF CONCENTRATION**

- Animal Physiology: The inter-departmental program in physiology includes research in the areas of regulatory, reproductive, comparative, exercise, cellular, developmental, muscle, or neuro-physiology.
- Cellular and Molecular Biology: The inter-departmental program in cellular and molecular biology includes research in structural or functional aspects of cells or subcellular components, or the interactions between cells.
- Environmental Toxicology: The toxicology program provides intensive training in basic toxicological principles and techniques. Courses and research expose trainees to mechanisms of intended and unintended interactions between living systems and potentially toxic agents from the point of view of biochemistry, physiology, ecology, public health, environmental law and regulation, pest management, pollution control and repair, and testing and residue analysis of toxicants.
- Ethology: Ethology is the naturalistic study of normally occurring animal and human behavior. The program provides intensive training in basic ethology with specialized studies available in the development of ethology, and physiology of behavior; human ethology; and behavioral ecology and sociobiology.
- Plant Physiology/Biochemistry: This program provides the opportunity for intensive training and research experience in areas transcending the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of energy and agriculture, primarily at the biochemical and physiological level.
- Reproductive and Developmental Biology: The inter-departmental program includes research in animal and plant development, reproductive endocrinology and control of reproductive function, gene regulation and cellular interactions in development.

**5110-20-30 Cellular and Molecular Biology (3, 3, 3)** Survey of cell structures and functions at molecular and supramolecular level. 5110—Cellular organization; cell metabolism; energy production and use; membrane structure and function; cellular communication. 5120—Flow of biological information, cell growth and replication; cellular motility; virus-cell interactions. 5130—Structure and function of specialized cells; muscle, nerve, germ cells, blood endocrine and immune systems; chemotaxis and phototaxis; differentiation, aging and cancer. Prereq: Consent of instructor.

**Management Science**

**MAJOR DEGREE**

**Management Science**

**Committee:**

**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 complex problems. The program’s flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science course work 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 requires concentrated study in a supporting area. Supporting areas are available in other departments of the College of Business Administration (excluding statistics) as well as in computer science, public administration, ecology and other areas, subject to approval by the Management Science Committee.

Applications are encouraged from all majors, but mathematics background equivalent of 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 by full-time students. However, students may start the program in any quarter and may pursue an M.S. degree in Management Science on a part-time basis.

**Course Requirements**

<table>
<thead>
<tr>
<th>Quarter Hours</th>
<th>Management Science 5310-20-30-35-40</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied concentration area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(approved by advisor)</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Statistics 5110</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Statistics elective (5000 level or above)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mathematics (4000 level or above)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Electives selected from mathematics, statistics, computer science, and/or management science</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Electives in any area approved by advisor</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td></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 a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirements. 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. 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 45 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.

For course listings and description of the Ph.D. program in Management Science, refer to p. 44.
The College of Law is, since 1981, conducted on the semester system. Information regarding admission, financial aid, academic policies, extracurricular activities, and student services is available in the College of Law Bulletin. Students interested in the college should obtain a copy of the Bulletin from the Admissions Office, The University of Tennessee, College of Law, 1505 West Cumberland Avenue, Knoxville, Tennessee 37996. Completed application should be received before February 1 of the year of expected admission.

The University of Tennessee College of Law commenced operation in 1890 and has continuously sought to provide high quality legal education in a university community. While the principal objective of the college is to prepare students for the private practice of law, its total mission is more broadly conceived. The college exposes students to the legal issues of our society enabling them to develop analytical skills in respect of decisional law and statutes, the ability to communicate effectively to others their knowledge of the law, an awareness of the historical growth of the law, a knowledgeable appreciation of the interrelationship of law and society, and the ability to use law as an implement of societal control and development. Students are thus equipped to serve their community not only as advocates and counselors, but as policy makers and active, responsible citizens.

The coordinated program of the college has three dimensions: teaching and learning, research, and other services to legal institutions and the community. Each plays a significant role in the college as a modern law center.

The teaching and learning element of legal education at the college involves a cooperative classroom interaction between faculty and students in the analytical study of a host of questions and problems found in today's legal profession. These involve decisional law, statutory interpretation, administration regulation, techniques of trial and appellate advocacy, and the roles and responsibilities of the lawyer in advising and representing clients. While proper consideration is given to the problems of Tennessee law, the course of study is conducted with a view toward providing an awareness and understanding of the regional and national perspective to prepare our students for service in any state.

The college is also directly involved in providing service to the community of which it is a part. A major element of public service is centered in the Legal Clinic where students, under the guidance of skilled and experienced licensed practitioners, provide legal services to indigent persons of Knox County. Additionally, through research, consultation, and other services to legal institutions and groups within the state, the college seeks to participate in the development and improvement of the society in which its students may eventually practice law. The Public Law Institute is a primary example of this function.

In combination, the direction and objectives of the college lead to the development not of a narrow technician, but of a student of the law with the perspective, breadth, and understanding necessary for the accomplishment of the many tasks assigned by society to the legal profession.

THE COLLEGE OF LAW BUILDING

Since 1960 the college has occupied a building especially designed for teaching, study, and research in the law. In the spring of 1971 the college occupied the new wing begun in the fall of 1969. The new addition has doubled the available facilities. The library, the classrooms, and the offices are air-conditioned. Adequate classrooms, courtrooms, seminar rooms, a private office for each full-time faculty member, the well-equipped offices of the Legal Clinic, and a spacious, well-lighted Law Library are contained in this modern building. Stack space for more than 200,000 volumes will permit one of the largest law book collections in the South.

LEGAL CLINIC

The University of Tennessee Legal Clinic was established in 1947. Though the Legal Clinic provides legal assistance to indigent persons, it is designed primarily as a teaching device to correlate theory and practice. It introduces the student under faculty supervision to the law in practice through personal contact with clients and their problems. The Legal Clinic functions as a large law office in which the student gains experience in interviewing clients, writing legal letters, investigating and evaluating facts, preparing memoranda of law, preparing cases for trial or adjustment, and briefing cases. Classroom work supplements the handling of actual cases. The student is thus trained in the techniques of law practice and the management of a law office. The ethical responsibilities of lawyers and their function as public servants are stressed. Under present rules of the Tennessee Supreme Court, students, under the direct supervision of the Legal Clinic staff, are certified to practice before all the courts of Tennessee.

THE LAW LIBRARY

The Law Library contains the official state reports of all states, the complete National Reporter system which covers all states and the federal courts, the Annotated Reports, standard sets of miscellaneous reports, the reports of the Canadian cases and of English cases from the yearbooks to date. In addition to these, there are adequate encyclopedias, digests and dictionaries, standard textbooks, law reviews, and current looseleaf services, totaling together more than 133,000 cataloged volumes. The library is under the supervision of a law librarian who is trained in law and library science. Law students also have the use of the collections in the University Main Library, which is located across the street from the Law Library, the Undergraduate Library a few blocks away, and other branch libraries.

Degree of Doctor of Jurisprudence

The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have 84 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained in all six semesters and also for the combined work of the grading periods in which the last 28 hours
of credit were earned. Averages are computed on weighted grades. Grades are on a numerical basis from 0.0 to 4.0. A grade of 0.9 or above is a success. Eligible law students may receive credit towards the J.D. degree for acceptable performance in up to three (3) upper-level courses taken in other departments at The University of Chicago under independently approved plans for course selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit towards a graduate degree in the department offering the course. Note: Students are advised to consult The Graduate School's degree requirements as stated in the front section of this catalog as well as the requirements for this college.

**Dual J.D.-MBA Degree Program**

The College of Business Administration and the College of Law offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take lower-division course work than would be required if the two degrees were to be earned separately.

Admissions. Applicants for the J.D.-M.B.A. program must make separate application to, and be 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 are accepted by both colleges may commence studies in the dual program at the beginning of any term subsequent to matriculation in both colleges provided, however, that dual program studies must be started prior to entry into the last 28 semester hours required for the J.D. degree and the last 24 hours required for the MBA degree.

Curriculum. A dual degree candidate must satisfy the graduation requirements of each college. Dual degree students withdrawing from the dual degree program before completion of both degrees will not receive credit towards graduation from either college for courses in the other college, except as such courses qualify for credit with regard to the dual degree program. For students continuing in the dual degree program, the J.D. and MBA degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award credit toward the J.D. degree for acceptable performance in a maximum of 8 semester hours of approved graduate-level courses offered by the College of Business Administration. A student shall receive 2 semester hours of credit for each such course where the student has successfully completed all courses required by the law faculty specifies otherwise. Two of the 8 semester hours must be earned in Accounting 5810 or a more advanced accounting course. If College of Law credit is given for such accounting course, the dual degree student may not receive College of Law credit for Legal Accounting (Law College Course 8590).

The College of Business Administration will award credit toward the MBA degree for acceptable performance in a maximum of 8 semester hours of approved courses offered by the College of Law.

Except while completing the first year of law in the College of Law, students are encouraged to take courses which will assist in the integrative facets of the joint project by taking courses in both colleges each year.

**Awarding of Grades.** For grade recording purposes, grades for law and business courses and in the College of Business Administration for law school courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business administration course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a College of Law course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

**NON-LAW ELECTIVE COURSE CREDIT**

Students enrolled in the J.D.-M.B.A. degree program may not receive credit towards the J.D. degree for courses in the College of Law, students are included in the computation of the student's cumulative averages. Grades for law courses will not be converted to the numerical basis from 0.0 to 4.0. A grade of 0.9 or above is a success. Different rules apply to the student enrolled in the Dual J.D.-M.B.A. Program. Grades must be earned according to the grading system of the respective college, e.g., numerical grades for law courses, letter grades for graduate courses. Refer to page 15 for the grading scale acceptable toward meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent record.

**Faculty**

Professors:


Associate Professors:


*Distinguished professor.*
legal and economic thought, use of economic in legal decision making and tool of legal criticism.


8590 Legal Accounting (2) Accounting problems and techniques, use and understanding of accounting information.

8650 Copyright, Patent and Trademark (3) Protection for intellectual property under federal and state law; patents, trademarks and trade names, trade secret copyright, tax considerations, international aspects.

8655 Legal Imagination (3) Systematic study of literature and its application of accurate, fluent, and creative legal composition.

8670 Legal Writing (1) By arrangement. Completion of a potentially publishable Casenote or Comment or Perspective for the Tennesse Law Review or participation as a member of a faculty supervised moot court competition. SNC only.

8680 Legislation (3) Interpretation and drafting of statutes, legislative process, and legislative power. Judicial views on legislative process subjected to critical analysis of legislative process and applicable constitutional principles.

8690 Modern Land Use Law (2) Land use planning, nuisance, zoning, eminent domain.

8700 Local Government (3) Distribution of power between state and local governmental units; sources of authority for limitations on local government operations; creation of local governmental units and determination of their boundaries; home rule; problems represented by federalization of local government units; problems in financing of local services; influence of federal programs on local government finance and decision making.

8710 Natural Resources Law (3) Selected materials of interest, conveyances, royalties, grants and reservations, leases, and taxation.

8740 Business Associations (4) Legal forms of cooperative business enterprise: agency, partnership, limited partnership, corporation.

8750 Remedies (4) Judicial remedies; damages, restitution, and equitable relief. Consideration of availability, limitations and measurement of various remedies. Comparative evaluation of remedies available in various situations.

8755 Selected Problems in Remedies (3) Course content varies. Topics: civil rights injunctions, remedies in complex litigation (class actions and or derivative suits), problems in restitution. Prereq: 8750 or consent of instructor.

8760 Advanced Business Associations (2) Prereq: 8740.


8800 Sales and Secured Transactions (4) Art. 2 (Sales) and Art. 7 (Documents of Title) of the Uniform Commercial Code. Brief survey of surveyship and guaranty. Art. 9 (Security Interests in Personal Property) of the Uniform Commercial Code.

8815 Discrimination and the Law (3) Comparison of race, sex and other invidious discriminatory practices and practices that are not intentionally discriminatory; education, employment, housing and other social and economic activities; emphasis on legislative enforcement of protection of equal rights; role of the Court in this endeavor.

8820 Securities Regulation (3) Advanced problems of governmental regulation of issuance of securities.


8840 Wealth Transfer Taxation (3) Transfers of wealth at death (estate tax) and during life (gift tax); generation-skipping and anti-termination provisions and their inter-relationship of transfer taxation. Prereq: 8860.

8855 Tax Theory (3) Methods and purposes of government revenue collection through examination of economic theses and development and criticism of proposed schemes of taxation. Prereq: 8860.

8862 Income Tax II (3) Partnership taxation; corporate reorganizations and distributions; transactions among corporations and shareholders. Prereq: 8860.


8905 Decedents' Estates (3) Nature, creation, transfer, termination, and modification of trusts; fiduciary administration; interstate succession; validity, execution, mistake, revocation, probate and contest of wills; adoptions, advancements and contribution of wills.


8955 Trade Regulation Seminar (2) Antitrust laws and taxes applicable to regulated industries.

8960 Office Practice Seminar (2) Techniques of law office management; methods and practice techniques in preparation of various legal instruments, office accounting, interviewing and counseling, management of personnel.

8985 Directed Research (1-2) Hours to be arranged. Independent research under direct supervision of instructor; maximum of one each year in last two years of study. Proposal must be approved by Academic Standards Committee.

8990 Land Finance Law (2) Financing devices: mortgages, deeds of trust and land contracts, problems involved in transfer of interests subject to these devices, and problems incurred in event of default. Contemporary problems arising in such areas as condominiums, cooperatives, housing subdivisions, and shopping centers.

Legal Clinic Courses

Student are eligible to enroll in clinical courses after the successful completion of their fourth semester in addition to meeting other specified prerequisites. Students must enroll in only one clinical course per semester and are limited to a total of two courses.

Clinical courses are 8746, 8756, 8775, 8785.


8785 Economic Development (4 or 5) Models and skills pertaining to representation of corporations and businesses. Non-litigation skills: negotiation, counseling, document preparation, business planning and representation before various state and federal agencies. Supervised fieldwork: legal representation of community groups and small business ventures. Ethical issues during supervised fieldwork, selected problems of professional responsibility. Prereq: 8740 and 8862 (3882 may be taken concurrently with 8785 with consent of instructor).

NOTE: Students receiving credit for 8170 prior to taking an Introduction to Advocacy course (8746 or 8756) will receive 5 hours credit for taking the Introduction to Advocacy course. Students receiving credit for taking the Introduction to Advocacy course will receive 4 hours credit rather than 6 hours credit. Students enrolling in 8746 after completing 8745 or 8756 will receive 4 hours credit for 8745. Students enrolling in 8746 or 8756 after completing 8775 will receive 7 hours credit for the Introduction to Advocacy course.

Seminars

8240 Arbitration Seminar (2) Arbitration of labor agreement disputes. Judgeship of arbitrators, nature of process, relationships to collective bargaining, selected arbitration problems on various topics under collective bargaining agreement, and role of lawyers and arbitrators in the process.


8345 Criminal Law Seminar (2) Advanced problem in criminal law. Prereq: 8300 or consent of instructor.

8400 Estate Planning Seminar (2) Problems of estate planning both inter vivos and testamentary. Advantages and disadvantages of various types of ownership. Law and practice of fiduciary administration, insurance, wills, future interests, trusts, corporations, partnerships, and gifts as related to estate planning. Research on assigned topics. Drafting of estate plan for hypothetical fact situations. Prereq: 8905 and 8840.

8545 Juvenile Law Seminar (2) Unique history and philosophy of juvenile justice system. Jurisdiction, judicial and extrajudicial functions of juvenile court, and various dispositional alternatives. Judicial opinions and materials from fields of history, sociology, and psychology. Knox County Juvenile Court serves as laboratory for students; professional staff from the Court participate in seminar on regular basis.

8550 Labor Relations Seminar (2) Selected labor relations law problems.

8580 Law and Current Problems Seminar (2-3) Seminar in the Professional Competence of the Lawyer (2) Typical situations in which malpractice claims arise: third party claims, conflicts of interest, breach of fiduciary duties; examination of difficult problems of proof involving issues of causation, res ipsa, hallmark of much malpractice litigation.

8580 and 8590 Law and Mental Health Seminar (2) Psychiatrist's role, role of psychiatrist, and relationship to role of legal counsel; assigned readings; field work in mental health clinic; jointly taught by law professor and psychiatrist.

8780 Business Planning Seminar (2) Selected problems on corporate and tax aspects of business planning and transactions. Prereq: 8860, 8862, and 8740.

8785 Commercial Law Seminar (2) Content varies. Planning seminar to execute a complex commercial transaction: sale and financing of major equipment. Problems in commercial transactions, major research paper. Prereq: 8860.

8890 Environmental Protection Seminar (2) Team-teaching and selected experts. Problems of regulating in defense of environment and mobilizing
public and private efforts in defense of environment. Problems of proving environmental impact of selected projects, interpretation and evaluation of scientific data, use of expert witnesses. Special environmental concerns of region, e.g., TVA operations, strip mining, forest management, wildlife preserves. Prereq: 8490.

8910 Administrative Law Seminar (2) Principles of administrative law. Discretion, choice of adjudication or rulemaking to develop administrative policy, consistency in administrative action.

8930 Consumer Protection Seminar (2) Selected problems in consumer protection.

8935 Law and Medicine Seminar (2) Medical profession's involvement in judicial process: (1) medical malpractice and alternatives to fault-based liability; (2) responsibilities for disposition and care of dead bodies and legal principles governing organ transplantation; (3) expert medical proof and testimony; (4) medico-legal aspects of euthanasia; (5) more specific matters: legal import of medical profession's various canons of ethics.

8995 Land Acquisition & Development Seminar (2) Alternative business forms to prepare and present for seminar discussion. Major documents (notes, deeds, prospectus, etc.) necessary to accomplish acquisition or development of large pieces of raw land. Prereq: 8990.

Course Offerings Subject To Change

The necessity of adjustments to accommodate changing conditions may dictate modifications in the course offerings and other features of the program described above. Accordingly, the college reserves the right to make such variation in its program as circumstances may require. Prospective students who are interested in the precise course offerings at a given time or who desire other special information should make inquiry in advance.

It is necessary to offer some courses and seminars only on an every-other-year basis. Choice is based on subject matter and past patterns of student enrollment.
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

Anthropology

MAJOR

Anthropology

DEGREES

M.A., Ph.D.

Professors:

W. M. Bass (Head), Ph.D. Pennsylvania; C. H. Faukner, Ph.D. Indiana; R. L. Janiz, Ph.D. Kansas; F. W. Parmalee, Ph.D. Texas A & M.

Associate Professors:


Assistant Professors:

B. J. Howell, Ph.D. Kentucky; P. S. Wiiley, Ph.D. Tennessee.

Instructor:

M. A. Bass (part-time); Ph.D. Kansas State.

Research Assistant Professor:


The Department of Anthropology offers the Master of Arts and the Doctor of Philosophy degrees with concentrations in physical anthropology, cultural anthropology, archaeology, zoarchaeology, 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 two-thirds of the courses must be 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 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 concept and objectives in study of culture. Range of cultural phenomena and approaches to its study. Recommended prereq: 2530. Sp

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.) F for Sp

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.

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 precolonial period. Recommended prereq: 2530.

3555 Cherokee Ethnohistory (3) Survey of sociopolitical aspects of internal affairs and external
5400 History of Anthropological Theory (3)
Theoretical contributions of more influential anthropologists. Prereq: Consent of instructor.

5450 Comparative Social Organization (3)
Social structure in nonliterature societies. Kinship, age, sex, locality, and other factors in determining 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, dial 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 predominantly non-European American milieu. Prereq: 4250 W.

5510 Education in Cultural Perspective (3)
(Same as Curriculum and Instruction 5510.) F.

5511 Non-Western Education: Anthropological Approaches (3)
Analysis of traditional educational practices among non-Western peoples, problems from the perspective of Western models of education among American Indian, African tribal groups and Asian cultures. (Same as Curriculum and Instruction 5511.) W.

5600 Theory in Archaeology (3)
Review of development of archaeological theory. Coverage up to and including recent systems approaches. F.

5610 Problems in North American Archaeology (3)
Seminar to explore specific research problems in North American archaeology. Research topics on prehistoric ecology and settlement patterns in North America. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5620 Problems in Old World Archaeology (3)
Selected topics and research problems in European, Asian and African prehistory investigated in depth. Prereq: Consent of Corr. May be repeated. Maximum 9 hrs. (Same as Classics 5620.)

5640 Archaeological Resource Management (3)
Theory and practice—public, conservation, contract, and salvage/research archaeology. Legislation; contracts; responsibilities; certification; agencies and policies; project design, administration, and logistics; standards of field work, analysis and publication; archaeology and public; conservation archaeology as career. May be repeated. Maximum 6 hrs. W.

5660 Seminar in Prehistoric Lithic Technology (3)
Analytical review of major theoretical viewpoints in prehistoric stone industries; raw materials employed; techniques of measuring and describing skeletal material and human subject with emphasis upon practical applications to growth, nutrition and human 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)

5940 Skeletal Biology of Early Human Population (3)
Practical and theoretical approaches to analysis of prehistoric human skeletal populations. Demography, vital statistics, pathology, nutrition, and measurement of biological relationships as they relate to population as adaptive unit. Prereq: 3900. F.

5950 Paleopathology (4)
Identification and descriptive analysis of pathological conditions affecting human skeleton. Roentgenological, histological, and gross visual examination of skeletal material. Prereq: 3900 and/or consent of instructor. Lecture and lab.

5960 Dermatoglyphics (3)
Methods of dermatoglyphic analysis, genetics and population variation of various dermatoglyphic elements. Forensic applications; relationships to various genetic and chromosomal abnormalities. Prereq: Consent of instructor.

5980 Neanderthal Man and Human Evolution (3)
Morphological characteristics and evolutionary relationships of Neanderthals. Prereq: 4970 or consent of instructor. W, A.

5990 Human Variation (3)
Nature of human biological variation with emphasis on microevolutionary processes responsible for establishing and maintaining variation and relationship of variation to population structure. Prereq: 3900 or consent of instructor.

6000 Doctoral Research and Dissertation (3-15)
P/NP only. E.

6220 Seminar in Nutritional Anthropology (3)
Analytical review of major theoretical viewpoints in nutritional anthropology. Prereq: 5220 and consent of instructor. W.

6410-30 Seminar in Cultural Anthropology (3, 3)
Seminar offered each quarter primarily for doctoral candidates. Prereq: Consent of instructor.

6610 Selected Topics in Archaeology (3) May be repeated. Maximum 9 hrs.

6910 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

Art

MAJOR DEGREES

Art

M.F.A.

Professors:
D. C. Kurka, (Head) Ph.D. New York; R. A. Clarke, M.S. Wisconsin; D. G. Cleaver, Ph.D. Chicago; J. S. Falesett, M.S. Ohio State; W. C. Kennedy (Associate Head)

Associate Professors:

Assistant Professors:
D. Habel, Ph.C. Michigan; L. Kocianek, M.F.A. California (Davis); A. Neti, Ph.D. Pennsylvania; B. Lee, M.F.A. Yale.

The Art Department offers the degree of Master of Fine Arts. In order to become a candidate, the applicant must be admitted by The Graduate School and approved by the Department of Art. In addition to the admission requirements of The Graduate School, the Department of Art specifically requires the following:

1. A detailed letter of intent.
2. Three letters of recommendation from former professors or professionals in the field.
3. An undergraduate major in art or evidence of equivalent proficiency.

4. A portfolio to be evaluated by the faculty. Application forms and further information are available by writing to the Department of Art.

The Master of Fine Arts is the terminal degree in studio art. It is offered with concentrations in ceramics, graphic design, illustration, drawing, fiber-fabrics, painting, printmaking, sculpture and watercolor. Inter-area concentrations are available with consent of the faculty.

Six or more credits beyond the baccalaureate degree are required in residence. Residence is defined by the Department of Art as (1) a minimum enrollment of 6 hours per quarter, and (2) the use of Department of Art facilities so that students are available for discussion and criticism. Final examinations are oral, concurrent with project exhibition.

DEGREE REQUIREMENTS FOR M.F.A.

1. Successful completion of 30 hours of studio art.
2. Twelve hours of art history for graduate credit.
3. Seminar in Art History (4 hours) and Seminar in Art Criticism (4 hours) with 30 hours of studio art.
4. Ten hours of electives which may consist of any committee-approved combination of graduate credit courses outside the student's departmental concentration.
5. Final year evaluation: At the end of the first three quarters in residence the student must present work for evaluation by the faculty and receive permission to continue in the program.
6. Final 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 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 must produce an exhibition, and,
Assistant Professors:
A. D. Diefendorf, Ph.D. Washington; E. Hamby, Ph.D. Iowa; C. Ferrant, Ph.D. Tennessee.

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 the 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, cultural language differences, or speech disorders such as aphasia or stuttering. Students interested in a more advanced understanding of the area of specialization, may be required to make up such deficiencies.

Graduate course work and successful second year evaluation by the graduate faculty. May be repeated. Maximum 6 hrs.

4770 Seminar in Art History (4)
Pre: Consent of instructor. May be repeated. Maximum 6 hrs.

5900 Seminar in Art Criticism (4)
Theory and practice. Intended for majors in studio art.

5985 Graduate Ceramics (2-6)
Graduate course work and successful second year evaluation by the graduate faculty. May be repeated.

5975 Reading and Research in Art History (2)
Pre: Consent of instructor. May be repeated. Maximum 6 hrs.

4250 .)

4320 Introduction to Clinical Practice in Speech Impaired I, II (3, 3) (Same as Special Education 4320.)

4180 Speech Development of the Hearing Impaired I, II (3, 3) (Same as Special Education 4180.)

4200 Practicum in Speech Development of the Hearing Impaired I, II (3) (Same as Special Education 4200.)

4210-20 Language Development of the Hearing Impaired (3) (Same as Special Education 4210-20.)

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) (Same as Special Education 4250.)

4310 Stuttering (3) Nature and treatment. Review and integration of various theories. Pre: 3310 or consent of instructor. (Same as Special Education 4310.) F, Su.

4320 Introduction to Clinical Practice in Speech Pathology (3) Pre: 3300, 3305, 3310, 4040, and consent of instructor. (Same as Special Education 4320.) S/NC only. E

4070 Free Association (4) Oral and written free association as process for diagnosing and treating communication disorders. Includes didactic self-analysis W

4190 Speech Development of the Hearing Impaired (3) (Same as Special Education 4190.)

4200 Practicum in Speech Development of the Hearing Impaired (3) (Same as Special Education 4200.)

4210-20 Language Development of the Hearing Impaired (3) (Same as Special Education 4210-20.)

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) (Same as Special Education 4250.)

4310 Stuttering (3) Nature and treatment. Review and integration of various theories. Pre: 3310 or consent of instructor. (Same as Special Education 4310.) F, Su.

4320 Introduction to Clinical Practice in Speech Pathology (3) Pre: 3300, 3305, 3310, 4040, and consent of instructor. (Same as Special Education 4320.) S/NC only. E

4040 Appraisal of Speech and Language Disorders (4) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Pre: 3040, 3050, 3310, 4040, and consent of instructor. (Same as Special Education 4040.) F, S.
4330 Introduction to Speech Pathology (1-6)
Prereq: 4320 and consent of instructor. (Same as Special Education 4330) S/NC only. E

4340 Clinical Practice in Speech Pathology (1-6)
Prereq: 4330 and consent of instructor. (Same as Special Education 4340). May be repeated. S/NC only. E

4400 Voice Disorders (4) Etiology, diagnosis, and treatment of organic and functional voice disorders. Prereq: 4450 or consent of instructor. (Same as Special Education 4400.) E

4460 Clinical Practice in Audiology (1-6) Prereq: 4310, 4320, and 4330. May be repeated. 9 hrs. E

4520 Speech Pathology (3) Independent study of special problems in speech pathology. Prereq: Consent of instructor. E

4550 Problems in Speech Pathology (1-6) Prereq: Consent of instructor. E

4580 Problems in Audiology (1-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E


4620 Birth Defect Syndromes and Language Retardation (3) Examination of research literature relevant to birth defects and language retardation including clinical, educational, and socioemotional implications of such disorders. Prereq: 4610 or consent of instructor. Sp

4630 Practical Applications of Language Habilitation Techniques (3) Discussion and demonstration of various methods and procedures used in treating language retarded children. Prereq: 4610 or consent of instructor. W

4640 Parent Participation in Language Habilitation Programs (3) Nature of counseling and educational relationships with parents of exceptional children including emotional support for families, behavior management strategies, home training methods. Prereq: 4610 or consent of instructor. Sp

4650 Speech and Language of the Culturally Different Child (3) Discussion of speech and language differences between and among various minority groups, of different ethnic and class membership and from different geographic regions; their causes, and their effects upon educational programs. F, W, Su

4660 Topics in Language Retardation and its Habilitation (3) Lectures on selected topics by representatives of such fields as special education, early childhood education, educational psychology, genetics, and psychology. Prereq: 4610 or consent of instructor. Su

4720 Audiology II (4) Basic principles of clinical audiology; pure-tone, speech, and overview of special auditory tests. Prereq: 3710. (Same as Special Education 4720.) W, Su


4930 Aural Rehabilitation: Speechreading and Auditory Training (3) Rehabilitation of acoustically impaired by maximizing use of residual hearing and utilizing speechreading as receptive communicative process. Prereq: 4720. (Same as Special Education 4930.) F, W, Su

4940 Introduction to the Verbo-Tonal System (4) Prepr: 4720. Recommended prereq: 4930 and 3050. (Same as Special Education 4940.) F, W, Su

5000 Thesis (1-15) P/NC only. E

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 after degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: 4720 and 4930. May be enrolled at least 12 hrs. (Same as Special Education 5040.) E

5041 Advanced Clinical Practice in Audiology: Off-Campus Sites (1-6) Prereq: Consent of instructor. E

5054 Practicum in Hearing Aid Orientation and Communication Counseling (1-6) Practical exposure to counseling hard of hearing and family members concerning use and expectations of hearing aids, suggestions for better use of communicative skills. Prereq: 4720, 4930, and consent of instructor. May be repeated. Maximum 9 hrs. E

5050 Practicum in Verbo-Tonal Habilitation (1-6) Prereq: 4940, 5950, or consent of instructor. May be repeated. Maximum 9 hrs. E

5051 Practicum in Aural Rehabilitation (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 9 hrs. E

5060 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems with emphasis on their role in speech and language. Prereq: 3065. F, W

5070 Anatomy and Physiology of Hearing (3) Structure of human ear, pathology of hearing impairment, and psychoclinacoustics of audition. Prereq: 3710. F

5071 Electrophysiological Assessment of Auditory Function (2) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by ear, distortion in ear, and ear-analytic mechanism. Prereq: 4720, 5070 or consent of instructor. Sp

5100 Comparative Anatomy of the Peripheral Auditory System (3) Tutorial laboratory course in comparative anatomy of temporal bone employing micrometric dissection techniques. Prereq: 5070 or consent of instructor. E

5110 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, application of statistics, and completion of pilot research project. Prereq: Elementary statistics. F, W, Su

5117 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation used in audiology and speech pathology. Prereq: 3010. W, Sp

5119 Laboratory in Instrumentation in Audiology and Speech Pathology (1) Laboratory assignments designed to familiarize student with instruments for measuring speech and hearing processes. Prereq: 3711. E

5200 Seminar on Stuttering (3) Current significant research in problem of stuttering. Prereq: 4310 or consent of instructor. W, Su

5201 Aphasia (3) Historical review of aphasia literature; theories of brain function, aphasic classification and terminology, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 3520 or equivalent or consent of instructor. W, Su

5220 Seminar: Articulation Disorders (3) Current significant research in therapy and management of articulation disorders. Prereq: Undergraduate course in articulation disorders or consent of instructor. F, Sp

5230 Seminar: Voice Disorders (3) Current significant research in therapy and management of voice disorders. Prereq: 4400 or consent of instructor. W, Su

5390 Cleft Palate (3) Etiology, diagnosis and clinical management of cleft palate speakers, emphasis on speech. Prereq: 3310. (Same as Special Education 5390.) W, Su


5450 Sound Measurement and Audimeter Construction (3) Theory and practical application of audiometric techniques; factors in military and industrial audiology, role of audiologist in industry. Prereq: Basic Acoustics or consent of instructor. W

5451 Noise and Audiology (3) Audiologist's role in noise-related activity: clinical, legal and consulting applications. Prereq: 5450 or consent of instructor. W

5460 Advanced Audiology (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 4720. F

5470 Impedance Measurement in Audiology (2) Theoretical considerations behind emergence of impendence measurement in clinical measurement of hearing. Practical experience in using several impedance measuring devices. Prereq: 4720 and 5070. W

5490 Practicum in Hearing Conservation (1-6) Supervised on-site experience in hearing conservation programs at industrial settings. Prereq: 5040. May be repeated. Maximum 6 hrs. E

5500 Seminar in Audiology (1-6) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 16 hrs. F, Sp

5503 Special Auditory Tests (3) Theoretical and practical considerations of auditory procedures used for differential testing between cochlear vs. retrocochlear auditory lesion, identifying central auditory lesions and nonorganic hearing loss. Prereq: 5480. W

5505 Special Problems in Audiology (1-6) Prereq: 4720 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs. E

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. E

5540 Seminar in Language Pathology (3) Nature, etiology and treatment of retarded language development in children. Prereq: 4610 (Same as Special Education 5540.) Sp

5550 Special Problems in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5560 Independent Study in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5570 Management and Supervision for Speech-Language-Hearing Professionals (3) Management
5600 Independent Study in Audiology (1-6) Special study or research project in field of audiology. May be repeated. Maximum 6 hrs. E

5610 Practicum: Language Pathology in Children (3) Seminar and/or practicum involving discussion and utilization of testing tools and analyses of habilitative philosophies, specialties and techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

5651 Seminar in Language Differences (3) Significant research relevant to language difference of culturally different children. Prereq: 4650. Su

5730 Hearing Disorders (3) Advanced study of auditory disorders commonly encountered in medical environment. Etiology, pathology and evaluative procedures to differentiate lesions of auditory mechanism. Field trips may be required. Prereq: 4720 or equivalent and 5070. F

5740 Pediatric Audiology (3) Advanced study of theoretical and practical considerations of procedures to evaluate hearing of infants and small children. Prereq: 4720 or equivalent. W

5750 Educational Audiology (3) Advanced case management of impaired child; audiology follow-up; educational alternatives, teacher and parental counseling, social adjustment, classroom acoustics and state and federal guidelines. Prereq: 5040 and 5440. W, Su

5760 Seminar in Psycholinguistic Concepts in Speech Pathology (3) Psycholinguistic concepts and information theory in studying the normal acquisition of language and certain disorders of language. Prereq: Consent of Instructor. (Same as Psychology 5760) Sp

5930 Advanced Aural Rehabilitation (3) Procedures and program assessment of communicative functions and counseling strategies for hearing impaired. Prereq: 4930. Sp

5950 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 prereq: 3050, 4720, and 4930. F, W, Su

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6010 Experimental Phonetics (3) Acoustical and physiological analyses of speech production and perception. Prereq: 5119 or consent of instructor. F

6019 Experimental Phonetics Laboratory (2) Must be taken concurrently with 6010. W

6020 Psychacooustics (3) Auditory reception and perception of nonspeech stimuli. Prereq: 6010. W

6029 Psychacooustics Laboratory (2) Must be taken concurrently with 6020. W

6060 Applied Anatomy and Physiology of Speech Mechanism (3) Dissection and related readings. Prereq: 5060 or equivalent. Sp

6069 Laboratory in Applied Anatomy & Physiology of Speech Mechanism (2) Must be taken concurrently with 6060. Sp

6070 Experimental Techniques in Cochlear Physiology and Neurophysiology (3) Prereq: 5070 or equivalent. W, A

6080 Seminar in Speech Science (3) Advanced study of experimental areas such as speech physiology, acoustics, 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. Sp, W, A

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. W, A

6110 Experimental Design in Speech and Hearing (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. S

6117 Theories of Hearing (3) Physiological process basic to classical theories of hearing related to sensitivity, loudness, pitch, and discrimination of acoustic stimuli. Prereq: 5070 and consent of instructor. Sp, A

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. Sp

6500 Advanced Seminar in Audiology (3) Prereq: Consent of instructor. May be repeated. Sp

6520 Advanced Seminar in Speech and Language (3) Topics vary from quarter to quarter but include advanced study of abstractions of voice, articulation, speaking rate and rhythm, language development or use, and language symbolization. Prereq: Consent of Instructor. May be repeated. E

6550 Directed Research (1-6) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

6570 Directed Study in Speech Pathology (1-3) May be repeated. Maximum 9 hrs. E

6580 Directed Study in Audiology (1-3) May be repeated. Maximum 9 hrs. E

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 9 hrs. E

6600 Directed Study in Hearing Science (1-3) May be repeated. Maximum 9 hrs. E

Biochemistry

MAJOR DEGREES

Biochemistry M.S.; Ph.D.

Professors:
W. D. Wicks (Head), Ph.D. Harvard; J. E. Churchich, Ph.D. Sheffield (England); J. G. Joshi, Ph.D. Poona (India); K. J. Montgomery (Coordinator of Biology), Ph.D. Rochester; T. P. Crane (Emeritus), Ph.D. Michigan.

Associate Professor:
L. Huang, Ph.D. Michigan State.

Assistant Professors:
R. H. Feinberg, Ph.D. California (Berkeley); E. Fiere, Ph.D. Virginia; J. W. Koontz, Ph.D. Kentucky; J. D. Richter, Ph.D. Arizona State.

The graduate program involves successful completion of a series of graduate courses and seminars. In addition, the M.S. degree requires research leading to the writing and oral defense of a thesis, while the Ph.D. degree requires successful completion of a comprehensive examination and extensive research leading to the Ph.D. dissertation and its oral defense.

THE MASTER'S PROGRAM

This program requires about two years of full-time study and provides both breath and depth of training by mixing classroom instruction with research laboratory experience. Students completing this program will have a sound foundation in modern biology and chemistry and will be equipped to follow and absorb future advances in these fields. Recent graduates of this program are now involved in such occupations as industrial pharmaceutical research, junior college and high school teaching, hospital and university laboratory work, cancer research, scientific journalism, and pursuit of Ph.D. degrees.

Candidates usually should offer course work covered by an undergraduate major in the biological sciences, chemistry or biochemistry. Departmental requirements consist of the satisfactory completion of 48 credit hours of graduate work and the mastery of the subject matter of the following courses:

1. Introductory Organic Chemistry with laboratory (at least one year)*, and a minimum of three quarters of approved physical chemistry.

2. A minimum of 12 quarter hours of approved biology courses beyond the introductory level, including at least 3 hours of genetics and 3 hours of physiology.


4. At least 9 hours of advanced level seminars in the following:
   - Biochemistry 6410, 6010.
   - At least 9 hours of Master's research and a thesis.

6. A final oral examination which will cover both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

An incoming student must present course work covered by an undergraduate major in the biological sciences, chemistry or biochemistry. Departmental requirements for the awarding of the Ph.D include mastery of the subject matter indicated in the following list of courses:

1. Introductory Organic Chemistry with laboratory (at least 1 year)*, Introductory Physics*. Differential and Integral Calculus*, minimum of three quarters of approved physical chemistry (Biochemistry 4210-20-30 or 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.


3. At least two quarters of approved graduate courses in chemistry, physics, or other physical sciences, for example:
   - Chemistry 5110-20-30-35, Chemistry 5340, Physics 5440, Physics 5510-20-30. No survey or review courses will be allowed.

4. At least two courses selected from 6110-20-30-40-50-60.

5. Participation in Biochemistry 6410 and in the Advanced Biochemistry Seminar (6010) during the entire period of residence.

6. Comprehensive examination: usually taken after the first year of study.

7. A dissertation reporting the results of original and significant research carried out during the term of candidacy.

8. A final oral examination which will be concerned primarily with the student's dissertation.

*Though completion of these courses or the equivalent is required, they may not be taken for graduate credit.

College of Liberal Arts/Biochemistry 109
Petitioning for Master's degree: Students who have passed the comprehensive examination in the Ph.D. program and have completed at least 45 hours of approved course work for graduate credit, at least two-thirds of which must be at or above the 5000 level, may petition the department for an award of a Master's degree. The additional requirements for such a degree shall be:

a. The preparation of a research manuscript suitable for submission for publication in a major scientific journal; and oral defense of that manuscript before an examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department, or

b. Publication of at least one full-length paper in a major biochemical journal as senior author.

5410-20 Cellular and Comparative Biochemistry
4 credits
Electrolyte behavior; chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture, synthetic metabolism; nucleic acid function, protein synthesis and biochemical genetics; regulation of biological processes. Must be taken in sequence. Prereq: 4110-20 or equivalent, or consent of department. F, W, Sp

5450 Special Topics (1-3) Registration only by prior arrangement with department. For students who have passed Ph.D. preliminary examination or are in advanced stage of graduate studies. Topic title posted in advance. May be repeated. Maximum 9 hrs.

Biography

4150 Scientific Illustration (3) Introduction to design and production of graphs, charts for scientific illustration; planning of poster presentations and displays. No graphics background required. Prereq: Advanced standing in a science curriculum; consent of instructor.

Botany

MAJOR

DEGREES

Botany

M.S., Ph.D.

Professors:

R. W. Heriton (Head), Ph.D. Michigan;
E. C. Cleasby, Ph.D. Duke, H. DeSelm, Ph.D. Ohio State; A. M. Evans, Ph.D. Michigan;
W. R. Herron, Ph.D. Chemistry 41910-20-30, or consent of instructor.

5410 Advanced Topics in Biochemical and Biophysical Methods (1-3) Application of modern conformational and biophysical techniques and instrumentation to biological macromolecules and membranes. Static and time-resolved fluorescence spectroscopy, calorimetry, magnetic resonances, x-ray crystallography, gene cloning, hybridoma technology, electron microscopy and others. Prereq: 5510-20-30 and 4230.

5420 Advanced Topics in Mechanisms of Enzyme Catalysis (1-3) Enzymes: functional groups; specificity and rate accelerations; enzyme-substrate complementarity; theories of catalysis; measurements and magnitude of catalytic rate constants; rapid mixing techniques; relaxation methods; rate-determining processes; group transfer reactions; oxidations and reductions; eliminations, isomerizations and rearrangements and reactions that make and break carbon-carbon bonds. Prereq: 5510-20-30 and 4220.


5440 Advanced Topics in Membrane Structure and Function (1-3) Structural organization of biological membrane components, dynamic properties as studied biochemically and biophysically, selected topics of membrane functions related to structural organization. Prereq: 5510-20-30.

5450 Advanced Topics in Metabolic Regulation (1-3) Current literature. Regulation of enzymatic activity by metabolites or hormones; regulation due to ligand interactions; enzyme modification: hormones, receptor interactions, internalization, degradation and recycling. Prereq: 5510-20-30.

5460 Advanced Topics in Physical Biochemistry (1-3) Structure and function of proteins, nucleic acids; and the relationship of the larger structure of biological macromolecules and membranes, nature and mechanisms of conformational changes and phase transitions, statistical thermodynamics of conformational transitions and characteristic of conformational states. Prereq: 5510-20-30 and 4230.

5410 Current Topics in Biochemistry (1) Seminars and lectures dealing with current advances in field of chemical biology. May be repeated with consent of department. Prereq: 5510-20-30.

5420 Current Topics in Biological Membrane Research (1) Current literature on biological membrane research. Prereq: 4110-20 or equivalent. May be repeated. Maximum 3 hrs. (Same as Microbiology 6420): S/N only. F, W, Sp

5431 Current Topics in Environmental Toxicology (1) Critical reviews of research problems and methods in environmental toxicology; behavioral toxicology; advanced state of graduate studies. May be repeated. Maximum 6 hrs. (Same as Ecology 6431): S/N only. F, W, Sp

6440 Current Topics in Regulation of Protein Structure (1) Covalent modifications of proteins by phosphorylation-dephosphorylation, allostery interactions, etc. Prereq: 5410-20-30. May be repeated. Maximum 9 hrs. S/N only. F, W, Sp

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 stage of graduate studies. Topic title posted in advance. May be repeated. Maximum 9 hrs.

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, botany, cytology, cyto genetics, ecology, genetics, lichenology, morphology, mycology, physiology, cytology, and taxonomy.

Requirements for admission: In addition to the general Graduate School requirements (see page 11) the botany department also strongly recommends submitting aptitude and advanced scores from the Graduate Record Examination, 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 19-22. Educational service is required of each graduate candidate and such service will include teaching and/or ancillary services performed in the department related research.
THE MASTER'S PROGRAM

A. Thesis Program
1. Satisfactory preparation of a written form and its oral defense to the student's committee of a research proposal suitable for a thesis problem. Must be completed before enrollment in Botany 5000.
2. Demonstrated reading proficiency in one modern foreign language or in the use of computers for data analysis. Proficiency in a foreign language may be demonstrated by satisfactory performance on an examination or an A or B in French 3030 or German 3030 (can also be applied to the doctoral program).
3. Satisfactory completion of 2 credit hours at the 6000 level.
5. Presentation of a thirty-minute departmental seminar.

B. Non-Thesis Program
1. Satisfactory completion of 51 quarter hours of approved graduate courses of which 30 quarter hours must be in botany including Botany 5003 and 5004.
2. Satisfactory completion of 2 credit hours and oral defense.
3. Satisfactory performance on a final written examination on 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 form and oral defense to the student's committee of a research proposal suitable for a dissertation problem. Must be completed before enrollment in Botany 6000.
2. Satisfactory performance on a written and oral comprehensive examination.
3. Presentation of oral and written work in 9 or more cognate areas outside of the department totaling 9 graduate credit hours with at least a B average.
4. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030.
5. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation).
7. Presentation of a one-hour departmental seminar near the end of the doctoral program.

*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.

*3010-20 Plants in Evolution (4, 4) Monera to angiospermae; emphasis on evolutionary relationships, morphology and development. Prereq: 6 hrs. in biological sciences. F, W

**3030 Field Botany (4) Study of plants in natural environments including plant identification, collection, preservation and basic ecological concepts. Prereq: 6 hrs in biological sciences. Sp, Su

3031-32 Field Botany (4, 4) Emphasis on fall and winter flora respectively. Prereq: 3030. Need not be taken in sequence. F, W

*3050 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. Sp, Su

*3070 Genetics and Society (3) An introduction to genetics, anthropological and genetic field trips, field research on their implications for human society. (Same as Anthropology 3070.) W

*3080 Biology and Human Affairs (3) Basic biological principles involved in deterioration and preservation of environment in which human cultures may survive. F

*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. Lecture and lab. Prereq: 1 yr general chemistry and 1 yr biological science. F, Sp, Su

4017 Field Mycology (3) Field experience on identification of higher fungi. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: 3010-20 or equivalent. Su, A

4021 Field Bryology (3) Field experience on identification of mosses and liverworts. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs of botany. Recommended prereq: 3010-20 or equivalent. Su, A

4022 Field Lichenology (3) Field experience on identification of liverworts. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: 3010-20 or equivalent.

4023 Field Agrostology (3) Field experience on identification of grasses. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: 3010-20 or equivalent. Su, A

4030 Mechanisms of Plant Speciation (3) Processes of speciation emphasizing population genetics, isolation, drift, hybridization, variation in populations, establishment of population barriers and other aspects of plant speciation. Prereq: 3010 and Biology 3110. W

4045 Aquatic Vascular Plants (3) Field experience on identification of aquatic vascular plants. Frequent field trips, field recognition of species and habitats. Prereq: 6 hrs botany. Recommended prereq: 3010-20 or equivalent. Su, A

4050 Synanthropology (3) Field experience on identification of composites. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: 3010-20 or equivalent.


4061 Field Physiology (3) Field experience on identification of fresh water algae. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: 3010-20 or equivalent.

4075 Botanical Photography (3) Photography of natural history subjects and achievement of technical and aesthetic skills and knowledge to produce illustrations for class, seminar or public lecture. Landscape, habitat, close-up and small object photography, in color, using 35 mm format. Limited shared equipment available. Preference given to students having developed their own equipment. Film and processing costs paid by student. Photos processed and critiqued in class. Prereq: 6 hrs of botany. Recommended prereq: 3010-20 or equivalent.

4830 Field Measurements in Plant Ecology (3) Practice in use of field and laboratory instruments for measurement of environmental factors, plant functions, and for compostics. Data collection, analysis and interpretation of data. Visits to highly instrumented field sites. Prereq: 3030 or equivalent. 1 yr physics and chemistry recommended. F

5000 Thesis (1-15) F/P only. E

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. Students encouraged to take this degree when the degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

5003-04 Non-Thesis Research (3, 3) Library, field, or laboratory research under supervision of staff members. Not for thesis candidates. E

5011 Mycology (4) Intensive survey of fungi, including all major classes, utilizing lecture, laboratory and field information. Occasional field trips. Prereq: 3010 and 3 labs. W, A

5021 Bryology (4) Taxonomy, phylology, ecology, physiology, and developmental morphology of bryophytes with emphasis on field studies and current research. Prereq: 3020. 1 hr and 3 labs. W, A

5022 Lichenology (4) Taxonomy, phylology, ecolog-

y, economics and physiology of lichens with emphasis on field studies and current research. Prereq: 3010, 5011 or 4017. Recommended prereq: 5061. 1 hr and 3 labs. W, A

5031 Vascular Plant Taxonomy (4) Characteristics of vascular plants, including principles of phylology and classification, based primarily on plants of local flora. Prereq: 3330 or equivalent. 2 hrs and 2 labs. Sp, A

5061 Phylogeny (4) Intensive comparative study of major divisions of algae, both freshwater and marine. Taxonomical, ecological, morphological, developmental and phylogenetic aspects. Field and laboratory studies, identification and classification; introduction to experimental approaches. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs. F, A

5065 Phytoplankton Ecology (4) Interaction between environment and phytoplankton. Nutrient uptake, primary production, competition, ecological theory applied to phytoplankton communities, and physiological adaptations by populations to environment. Prereq: 3010 or consent of instructor. F, A

5070 Principles of Biological Illustration (3) Principles and application of photography, including photomicrography and photomacrography, drawing
5080 Pteridology (4) Evolutionary study of lower vascular plants: morphology, cytology, ecology, life cycles and classification. Biosystematic studies and recognition of local species. Prereq: 3020-30 or consent of instructor. 2 hrs and 2 labs or field trips, F, A

5090 Morphology and Evolution of Basidiodocites (4) Structure and function of somatic and sexual life histories as applied to evolution in group. Cultures and specimens in laboratory. Prereq: 3010 or equivalent, F, A

5120 Agrostology (4) Collection, identification, classification, and phylogeny of tribes of grasses. Prereq: 3050 or consent of instructor. 2 hrs and 2 labs, F, A

5150 Advanced Morphology of Flowering Plants (4) Vegetative and reproductive organography; regulatory physiology, floral development, pollination mechanisms, embryology and derivations, seed and fruit development. Prereq: 3020-30 or 4120; 3210 or consent of instructor, F, A

5160 Biosystematics (4) Major experimental methods used in systematic and application to specific types of systematic problems. Cytotaxonomy, nomenclature, terminology and chemotaxonomy. Prereq: Consent of instructor. W

5210 Advanced Plant Physiology I (3) Plant cell metabolism: carbon, nitrogen and sulfur assimilation, respiration and biosynthesis of specialized plant products such as tannins, alkaloids and pigments. Prereq: Chemistry 3231. F


5235 Advanced Plant Physiology III (3) Growth and differentiation of plants at molecular, cellular and organismic levels. Hormonal regulation of development; macromolecular interpretation of differentiation. Developmental biology, cell, molecular biology and genetics. Prereq: 5210 or Biochemistry 4120 and a plant or cell physiology course. Recommended prereq: 1 yr of physics. W

5300 Qunternary Problems (4) (Same as Geology 5300) Prereq: 5301 or 5302. W

5310-30 Special Problems in Botany (1-6, 1-6, 1-6) Survey of selected topics from all areas of botany. Prereq: 3010 or equivalent. F, A

5340 Plant Geography (4) Distribution of ecosystems with emphasis on American types. Vegetation, climatic and historical aspects. Prereq: 4310. 2 hrs and 2 labs, W

5350 Analysis of Plant Communities (4) Plants as species and ecosystems components considered from standpoint of genecology, ordination, and ecosystem function. Prereq: 4310. 2 hrs and 2 periods (field trips). Sp

5360 Marine Ecology (3) Relationships of marine organisms to environment and their interactions with each other. Tropic relationships in neritic, coastal and estuarine ecosystems; succession; deep-sea ecology; stability. Prereq: One previous ecology course, W

5440 Seminar in Botany (1) Readings and discussions on advanced and specialized topics in plant and selected topics in botanical research. May be repeated. Maximum 12 hrs. S/NC only. F, W, Sp

5510-20 Systems Ecology (3, 3) 5510—Nature of ecological systems. System state and change of state. Elementary network conceptions of ecosystem. Prereq: 4310 or Zoology 4240; last qtr genphys major, or consent of instructor. Prereq: 5520-20 or 4120. 2 hrs and 2 labs for 5510; 5910 for 5520, 2 hrs and 1 lab for 5510; 1 lab for 5910. A, W

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6010 Advanced Topics in Morphology of Vascular Plants (2-4) Needs of students determine content. Topics selected from broad categories of experimental anatomy, morphology, and phlorography. Prereq: 3020-30 or 4120, 5910-20 or consent of instructor. May be repeated with consent of department. F, A

6060 Advanced Topics in Cryptogenic Botany (2-4) Advanced studies and current research in experimental phycology, mycology, bryology, phytology. Prereq: 3020-30 or 4120, 5910-20 or consent of instructor. May be repeated with consent of department. F, A

6130 Advanced Topics in Systematics (3-4) Needs of students determine content. Prereq: 3020-30 or 4120, 5910-20 or consent of instructor. May be repeated with consent of department. F, A

6130 Advanced Topics in Ecological Systems: Stability. Prereq: One previous ecology course. Recommended prerequisites: advanced plant physiology course. Prereq: Biology 5310 and at least 6 additional hrs in biological sciences. Sp, A

6201-22-23-24 Methods and Instrumentation in Laboratory Investigations (1, 1, 1, 1, 1) Intensive field investigations. Prereq: 3010-20 or 4120, 5310-20 or 4120, 5350 or 5960. Tu

6550-51-52-53-54 Methods and Instrumentation in Field Investigations (1, 1, 1, 1, 1) Intensive field investigations. Prereq: 3010-20 or 4120, 5310-20 or 4120, 5350 or 5960. Tu

6570 Experimental Plant Genetics (4) Genetics of plants and the principles of genetic change. Prereq: 5210 or equivalent. Prereq: Consent of instructor. S/NC only. Sp

6580 Plant Cytology (4) Intensive consideration of structure, biochemistry and function of subcellular components; differentiation and analytical centrifugation; photomicrography and microscopic anatomy. In tended for graduate students in the biological sciences. 2 hrs and 2 labs. Sp, A

6810 Plant Morphogenesis (2) Cytogenesis and behavior during mitotic and meiotic divisions in relation to structural changes, genetic controls, hybridization, speciation, and polyploidy. Laboratory emphasis on normal and aberrant meiotic systems and somatic chromosomes from plants and animals. Prereq: Biology 5310 and at least 6 additional hrs in biological sciences. Sp, A

6820-21-22-23-24 Methods and Instrumentation in Laboratory Investigations (1, 1, 1, 1, 1) Intensive field investigations. Prereq: 3010-20 or 4120, 5310-20 or 4120, 5350 or 5960. Tu

6830 Plant Anatomy and Cytology (4) Classification and characterization of world's regional ecosystems: Interrelations of climate topography, soils, vegetation, and fauna. Prereq: 5340. F, A

6840 Advanced Topics in Genetics (2-4) Literature survey of selected topics from all areas of genetics. Prereq: Biology 5110. Biochemistry 4110-20 may be repeated with consent of department. F, A

6850 Seminar in the History of Botany (2) F

6880 Advanced Topics in Plant Physiology (2-4) Requirements of student determine content, including growth and development, minor element nutrition; photoperiodism; radiation effects. Prereq: 5210; 1 yr college physics. May be repeated with consent of department. F, A

6890 Advanced Topics in Ecology (2-4) Needs of student determine content, including community analysis; biogeochemistry; bioclimatology; general and paleoecology; radiometric dating. Prereq: 5310, 5340, 5350. May be repeated with consent of department. F, A

6930 Advanced Topics in Systematic Botany (2-4) Needs of student determine content, such as morphophysiology and evolution, vascular plant cytogenetics; experimental taxonomy; current research in systematic; systems of classification. Seminars or lectures and labs depending on subject. Prereq: 3020-30, 5931. May be repeated with consent of department. F, A

Chemistry

MAJOR

DEGREES

M.S., Ph.D.


Assistant Professors: S. D. Aleksandros, Ph.D. California (Berkley); M. J. Sepaniak, Ph.D. Iowa State.

Students majoring in Chemistry for the Master's or doctoral degree are required to present as a prerequisite one year each of general, analytical, organic and physical chemistry with a satisfactory record. Students lacking any of these prerequisites may be admitted with appropriate deficiencies which must be removed before graduate credit. For students minoring in Chemistry, the...
prerequisite is two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

The department offers specialization in seven areas for the M.S. degree: analytical chemistry, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and physical chemistry.

The program leading to the M.S. 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.

The requirements for the M.S. degree in Chemistry consist of the satisfactory completion of:

1. A research and a thesis to give 9 to 18 hours of graduate credit including at least 6 hours at the 6000 level and one of the following groups: (1) for analytical, 5250-60-70; (2) for inorganic, 5420, 5710-20-30; (3) for organic, 5110-20-29-30-35; (4) for physical, 5340-50, 5410-20-30-50, (5) for theoretical, 5340-50, 5410-20-30-50; Physics 5210.

2. 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.)

3. Sufficient graduate course work in chemistry and/or a related field to make an overall total of 45 hours.

a. 4160-70.

b. Two of the following (except for polymer science): 5511, 5521, 5531.

c. For emphasis in polymer science, 5531, 5140-51, Polymer Engineering 4910 and participation in the Polymer Seminar Program during the entire period of graduate study.

d. For emphasis in environment, 5220, 5250-60-70, Ecology 5310, and Environmental Engineering 4030.

e. For emphasis in energy, 5410, 5610-20-30, a chemistry sequence (5110-20-30-35 or 5250-60-70 or 5420-30 or 5710-20-30, 5810), and Mechanical Engineering 4110.

f. For other specializations, one of the following sequences:

- For specialization in analytical, inorganic, organic, physical, or theoretical chemistry, 39 hours of additional graduate course work including at least 6 hours at the 6000 level and at least 12 hours of chemistry courses; participation in the Polymer Seminar Program during the entire period of graduate study.

- Grant of special permission by the appropriate departmental committee may be used for undesignated course work in this requirement upon approval of the student's faculty committee.

- All course selections must be approved by the appropriate departmental committee.

4. 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, and theoretical chemistry.

The program in chemical physics is conducted jointly with the Physics Department which offers a similar degree.

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.

For the Ph.D. degree in 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. Participation in seminar (5911-21-31) during the entire period of graduate study.

3. Course and specialization requirements:

a. 4160-70.

b. Two of the following (except for polymer science): 5511, 5521, 5531.

c. For specialization in analytical, inorganic, organic, physical, or theoretical chemistry, 39 hours of additional graduate course work including at least 6 hours at the 6000 level and one of the following groups: (1) for analytical, 5250-60-70; (2) for inorganic, 5420, 5710-20-30, (3) for organic, 5110-20-29-30-35; (4) for physical, 5340-50, 5410-20-30-50, (5) for theoretical, 5340-50, 5410-20-30-50; Physics 5210.

d. For specialization in environmental or energy, a six-month internship in a governmental or industrial laboratory; 39 hours of additional graduate course work including at least 6 hours at the 6000 level and the following: (1) 5220, 5250-60-70, Ecology 5310, Environmental Engineering 4030, plus selected courses from other areas of chemistry, environmental engineering, meteorology, microbiology, health physics, ecology, or related science, statistics, and industrial health; (2) for energy, 5410, 5610-20-30, a chemistry sequence (5110-20-30-35 or 5250-60-70 or 5420-30 or 5710-20-30, 5810), Mechanical Engineering 4110, plus other courses from areas such as catalysis, heterogeneous equilibria, kinetics, thermal science, combustion and propulsion engines, resource economics, nuclear engineering, and electrical engineering.

e. For specialization in physical chemistry, an examination on the basic principles of mechanics, electricity, and magnetism; 5410-20-30-50, 5110-20 or 5710-20-30, 6730 or 6810, Mathematics 4540, 4610, 4710, Physics 4610-20-30, 5110-20-30, 5210, 5610-20-30.

f. For specialization in polymer science, 4160-70, 5511, 5140-50, 5160 or 5170, Polymer Engineering 4910; 30 hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours of chemistry courses; participation in the Polymer Seminar Program during the entire period of graduate study.

G. All course selections must be approved by the appropriate departmental committee.

4. A comprehensive advanced examination in the field of specialization.

5. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or a language alternated.

6. A final oral examination.

*3211-21-31 Organic Chemistry (3, 3, 3) Comounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Required. Must be taken in sequence, Prereq: 1110-20-30. Corresponding laboratory (3219-29-39) is a coreq for students not having credit for the laboratory.

*3219-29-39 Organic Chemistry Laboratory (1, 1) Experiments on topics discussed in 3211-21-31. Corresponding lecture (3211-21-31) is a coreq for students not having credit for the lecture.


*3511-21-31 Principles of Organic Chemistry (3, 3, 3) Structure and reactivity of aliphatic and aromatic compound classes of synthetic utility. Use of spectroscopic and physical techniques to elucidate reaction mechanisms. Recommended for chemistry majors; also valuable for students in physical or biological sciences. Must be taken in sequence. Prereq: 1110-20-30. Corresponding laboratory (3529-39 or 3219, 3529-39 as a coreq) 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 need for operating knowledge of various spectroscopic and chromatographic techniques. Prereq: 3521-31 or 3219 is coreq for students not having credit for the lecture.

*3810 Radioactivity and Its Application (3) Radioactive materials in tracer and therapeutic applications. Radioactive decay, detection apparatus and techniques, tracer procedures and safety 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. F, W

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 equilibria and solutions, and chemical equilibria. 4170—Gases and kinetic theory, chemical kinetics, molecular spectroscopy, and introduction to chemical statistics. F, W

4210 Advanced Analytical Chemistry (3) Chemical separations including chromatography, ion exchange and solvent extraction; spectrophotometric techniques. Prereq: Analytical Chemistry. W

4219 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4210. Coreq: 4210. W

4220 Advanced Analytical Chemistry (3) Electroanalytical methods of analysis (including polarography, coulometry, and voltammetry), magnetic measurement methods, mass spectrometry, X-ray absorption and fluorescence techniques. Prereq: Analytical Chemistry. Recom: 3429 or 3529 as a coreq.

4229 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4220. Coreq: 4220. Sp

4420 Physical Inorganic Chemistry (3) Theoretical concepts leading to an understanding of inorganic chemistry, quantum theory of the atom, principles of molecular structure, and elementary nuclear chemistry. Prereq: 3430-20-30, 4110. W

4430 Intermediate Inorganic Chemistry (3) Application of theoretical concepts to inorganic elements, their chemical states, and their reactions. Prereq: 4420. Sp

4510 Organic Qualitative Analysis (3) Identification of pure organic compounds. Prereq: 3211-21-31, 3219-29-39 or 3219, 3529-39, 3 labs. Not open to students who have completed 4610. Sp

4550 Organic Reaction Mechanisms (3) Prereq: 1 yr of organic chemistry. W
4610 Advanced Chemical Experimentation (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 and experimentation. Prereq: 5311-39, 5331-39, 5410. 4610 not open to students who have completed 5410. W, S


5511 Survey of Inorganic Chemistry (3) Atomic structure, ionic structure, acidity, basicity, and covalent bond, periodic relationships of elements, inorganic stereochemistry, coordination chemistry, and descriptive chemistry of the elements. F

5521 Survey of Analytical Chemistry (3) Volumetric, gravimetric, and spectrophotometric analysis, acid-base, redox-reduction, complexion and precipitation equilibria, spectroscopic, electrolytical, and separation methods. F

5531 Survey of Organic Chemistry (3) Bonding in organic molecules, chemistry of hydrocarbons, aliphatic, cyclic compounds and conformations analysis, monofunctional, polyfunctional derivatives, carbonyl compounds, stereochemistry, aromatics, and spectral analysis of organic molecules by infrared, ultraviolet, nuclear magnetic resonance and mass spectral techniques. F

5550 Industrial Chemical Research (3) Practice of modern industrial research taught by case studies and visiting lecturers from industry. Course content varies; selection of good past and current industrial research practices. Prereq: Completion of 5000 chemistry course sequence.

5610-20-30 Chemical Basis of Energy Conversion (1, 1, 3) Use of 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.


5810 Nuclear Chemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure, and models, nuclear reactions, radiations and matter, radiation detection. Prereq: 1 yr of physical chemistry. A

5911-21-31 Chemistry Seminar (1, 1, 1) Departmental research, current research literature, general topics. May be repeated. Registration required each quarter except summer for resident graduate students. SNC only. F, W, Sp

6009 Doctoral Research and Dissertation (3-15) PrN only. A

6111 Selected Topics in Organic Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Consent of instructor. Maximum 9 hrs. A


6190 Organometallic Chemistry (3) Structure, bonding and synthesis of organometallic reagents. Applications to current problems in organic synthesis. 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: environmental chemistry, spectrochemistry, modern liquid chromatography, new electroanalytic methods, bioanalytical methods, and miniaturized and microprocessor applications in chemical instrumentation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6320 Natural Polymers (3) Structure, modification, and nonbiochemical utilization of natural polymers and their derivatives, semi-biochemically and biochemically derived monomers. 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 5110-20-30-35. SNC only. May be repeated. A

6420 Nuclear Magnetic Resonance (3) Theory of nuclear magnetic resonance spectroscopy with emphasis on high-resolution methods. Applications to problems in molecular structure and behavior. Prereq: Two of 5110-20-30-35.

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes pursuant to excitation of molecules by photons and electrons; 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 5250.

6475 Electronic Structure of Radicals (3) Applications of electron spin resonance to study of molecular conformation, structure, and bonding in organic and inorganic radicals; comparison of experimental results with theoretical predictions based on Walsh rules and on INDO molecular orbital calculations. Prereq: 5340-50 and 6520.

6480 Statistical Thermodynamics (3) Application of statistical mechanical methods to systems of chemical interest such as isochore effects on equilibrium and rate processes, phase equilibria, condensation phenomena. Prereq: 5410, 5450.

6495 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces, reaction cross-sections, "direct" vs "complex" modes of reaction, applications to gas-phase kinetics. Prereq: 5430.

6510 Thermodynamics of Solutions (3) Theory of regular solutions and of solutions with electrolyte solutes; calculation of activity coefficients and other thermodynamic properties; selected topics from literature. Prereq: 5410.
6520 Magnetic Resonance (3) Principles of magnetic resonance spectroscopy underlining nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq: 5340.

6711 Selected Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance: photoelectron spectroscopy, transition 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. A


6750 Molten Salt Chemistry (3) Structure, spectroscopic properties, solution thermodynamics, electrolyte chemistry and phase equilibria of molten salts. Solutions of metals in 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 analysis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6820 Molecular Vibration-Rotation Theory (3) (Same as Physics 6820.)

Classics
Professor: H. C. Rutledge (Head), Ph.D. Ohio State.
Associate Professors: G. C. Geisel, Ph.D. North Carolina; J. E. Shelton, Ph.D. Vanderbilt.
Assistant Professors: C. P. Craig, Ph.D. North Carolina; S. D. Martin, Ph.D. Michigan; D. W. Tandy, Ph.D. Yale.

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) A
3020 Herodotus (3) A
3030 Euripides (2) A
4020 Aeschylus, Sophocles (3) A
4040 Aristophanes (3) A
4050-60-70 Directed Readings in Greek (3, 3, 3) F, A

Latin
3440 Livy (3) A
3460 Elegiac Poets (3) A
4310 Selected Readings from Latin Literature (3) A
4320-30 Selected Readings from Latin Literature (3, 3) May be repeated. A; A
4340 Horace, Odes (3) A
4350 Tacitus (3) A
4360 Lucretius (3) A
4370 Readings in Medieval Latin (3) A
5410-20 The Latin Epic: Lucanetus, Vergil (3, 3) A; A
5510-20 Roman Comedy: Plautus (3, 3) A; A

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.) F

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.) W

3230 Roman Mythology (3) Study of myths created by Romans, as well as those the Romans borrowed from the Greeks, with reference to Roman attitude toward history, religion, and society. Readings, lectures, slides, and discussion. (Same as Religious Studies 3230.) Sp

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, their fall, the following Dark Age, and rebirth of Greek civilization. Illustrated lectures. W

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. W

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. Sp

3340 Cities of the Greek and Roman World (3) Archaeological survey 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 Mycenae, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied. F

3350 Shrines and Sanctuaries of the Greek and Roman World (3) Survey of major shrines and sanctuaries of Greek and Roman world with emphasis on archaeological remains. Such sites as Olympia, Epidauros, Paestum, Cumaean, 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. W

4220 Seminar in Classical Studies (3) Special problems in literatures and other arts of Greece and Rome. May be repeated with consent of department. A

4510 Selected Readings in Latin Literature in Transition (3) Content varies, may be repeated with consent of department. A

4610 Studies in Classical Archaeology (3) Variable content course offering subject matter not taught in existing course, or concentrating on one aspect of existing survey. Prereq. According to topic. May be repeated. Maximum 9 hrs. A

5820 Problems in Old World Archaeology (3) (Same as Anthropology 5620.) A

Computer Science
MAJOR DEGREE

Computer Science M.S.

Professors: T. Falgout (Head), Ph.D. Texas (Aerospace Engineering); F. Donaldson*, Ph.D. Texas; R. Gonzalez, Ph.D. Florida (Electrical Engineering); R. T. Gregory, Ph.D. Illinois (Mathematics); E. L. Hall, Ph.D. Missouri (Electrical Engineering); G. R. Sherman, Ph.D. Purdue

*UT Space Institute.
Programming (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations, computer programming. 4510 Advanced Systems Programming (3) Multi-tasking, overlays, advanced I/O techniques, high-level language macros, interrupt handling, teleprocessing facilities, virtual systems (all in a high-level language), and OS utilities. Prereq: 4510 and 4550

4590 Advanced Systems Programming (3) Multi-tasking, overlays, advanced I/O techniques, high-level language macros, interrupt handling, teleprocessing facilities, virtual systems (all in a high-level language), and OS utilities. Prereq: 4510 or equivalent.

4610 Operating Systems—Concepts and Facilities (3) Detailed examination of major operating systems. Memory, processor, device and data management, interrupts, machine-level input/output, loaders and relocation, device characteristics, data set organizations, SPOOLing. Prereq: 4510 and 4550. Students may not receive credit for both 4610 and 5670.

4620 Operating Systems—Case Studies (3) Alternatives in operating system design, dynamic reorganization, paging, segmentation, time sharing, time slicing, protection, concurrency, real-time systems. Examples from different operating systems analyzed as appropriate. Prereq: 4510 or equivalent or consent of instructor. W

4660 Principles of Compiler Design (3) Techniques of compiler design, scanning and parsing of languages, selection and interpretation, context-free grammars. Prereq: 4510. E


4750 Interactive Computer Graphics (3) Point plotting, vector generation, interactive graphical techniques, two-, three-dimensional transformation, perspective depth, hidden line elimination, shading, software and hardware system design. Discussion of use of these techniques in design, problem solving, mapping, architecture, and many other areas. Prereq: Computer programming, or consent of instructor. (Same as Computer Science 4750.)

4820 Introduction to Pattern Recognition (3) (Same as Electrical Engineering 4820.)

4830 Digital Image Processing (3) (Same as Electrical Engineering 4830.)

4850 Small Computer Systems (3) (Same as Electrical Engineering 4860.)

4910 Analysis and Management of Computer Installations (3) Analysis and design of computer systems, implementation, justification, personnel in systems; perspective on systems. Prereq: 3520 or equivalent. W

4980 Special Topics in Computer Science (1-4) Credit determined at registration. Prereq: Recommendation of Computer Science staff. May be repeated with consent of department. Maximum 9 hrs.

5000 Thesis (1-5) F/P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during the semester in which the 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. E

machines and halting problem. Register machines. Recursive and recursively enumerable sets, partial and total recursive functions. Time and space bounds, computations; the P vs NP problems. Prereq: 4710. A

5750 Theory of Formal Languages (3) Phrase-structure languages, their generators and processors. Types 0, 1, 2, and 3 languages; operations on languages and grammars; deterministic context-free languages. Theory of translation. Prereq: 4710. W

5775 Combinatorial Algorithms (3) Algorithms for solving optimization problems in graphs, networks and matroids. Precise notions of time and space complexity. Prereq: 4730. (Same as Mathematics 5775). A


5889 Data Security (3) Need for security and methods for achieving it; encryption, machine architecture, hardware and software implementation, historical and current approaches. Case studies in fraud and misuse. Prereq: 3520 or consent of instructor.

5910-20-30 Special Topics in Computer Science (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.

5940-50 Advanced Small Computer Systems (3, 3) (Same as Electrical Engineering 5940-50.)

5970 Independent Study in Computer Science (1-3) Consent of instructor. May be repeated. Maximum 9 hrs.

Cultural Studies

Asian Studies

3670 Islamic Literature in English Translation (4) Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian and Turkish. Readings include The Arabian Knights, The Rubaiyat of Omar Khayyam and Gibran's The Prophet.

4010-20-30 Readings in Asian Literature (4, 4, 4) Prereq: Mastery of intermediate level of Japanese, Chinese, Sanskrit, or Arabic and consent of instructor.

4012 Selected Topics in Asian Studies (4) Content varies. Maximum 12 hrs.

4531-32-33-34 Advanced Chinese (4, 4, 4, 4) Taped language program. Prereq: 3531-32 or equivalent or consent of instructor. Must be taken in sequence.


4 Afro-American Studies

3140-50-60 Directed Readings in Afro-American Studies (3) Undergraduate programs designed for students who are interested in doing intensive reading in some area of Afro-American Studies which is defined by the student and the instructor. Prereq: 2019 or 2020 and consent of instructor.


4310 Research in Afro-American Studies (4) Dealing with experiments and research practice. Prereq: 4219. W

4500 Issues and Topics in Afro-American Studies (3-4) Problems, topics and issues in area of Afro-American Studies. Content and credit determined by instructor. May be repeated. Maximum 12 hrs.

4530 Afro-American Women in American Society (4) Historical and contemporary social, economic and political factors in American society as they relate to the Black woman. (Same as Women's Studies 4830.)

4880 Afro-American Psychology (4) (Same as Psychology 4880.)

Comparative Literature

4013-23-32 Special Topics in Comparative Literature (3, 3, 3) Content varies; may be repeated. F, W, Sp.

4050-60-70 Dante and Medieval Culture (3, 3, 3) (Same as Italian 4050-60-70) A, A.

5012 Comparative Theories of Literature (3) Croce, Richards, Frye, Wellesk, and others. Prereq: Completion of three literature courses in foreign language above 3000, or equivalent. F

5022 Approaches in Comparative Literature (3) French and American schools; "comparative literature" vs. "general literature". Van Tijhun, C., Baidenspenger, Wellesk. Prereq: 5012; completion of three literature courses in foreign language above 3000, or equivalent. W

5032 Studies in Comparative Literature (3) Independent research problems. Prereq: 5012 and 5022. Sp

Cultural Studies

5101 Foreign Study (1-12) See page 103.

5102 Off-campus Study (1-12) See page 103.

5103 Independent Study (1-12) See page 103.

Linguistics

4000 Topics in Linguistics (3) Content varies. May be repeated. Maximum 9 hrs.

4020-30 Historical Linguistics, Neogrammarian School, and Growth of Structuralism (3, 3) 4020—Traces development of scientific approach to linguistics from Jacob Grimm and Franz Bopp through nineteenth century. 4030—Traces change in linguistic interest brought about by Saussure's Course and growing impact of anthropology and behaviorism on linguistic studies.

2450 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Spanish 4250.)

2440 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, Spanish 4260.)

2470 Introduction to Romance Linguistics (3) (Same as French, Spanish 4270.)

2427 Introduction to Slavic Linguistics (3) (Same as Russian 4271.)

4440 Socio Linguistics (3) (Same as English 4440.)
The teaching of freshman composition, (4) a thesis or 9 additional quarter hours of 5000- and 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 as follows:

- A, B, C, D, F
- W
- Sp

The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and his/her project director. In addition to the director, two other English Department faculty members will supervise and approve the project.

A creative project, for which 9 quarter hours credit is given. A collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose would be acceptable.

A critical dissertation, the nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and his/her project director. In addition to the director, two other English Department faculty members will supervise and approve the project.

A final examination. A candidate presenting a thesis or creative project must pass a one-hour oral examination, consisting of questions covering the general history and interpretation of English and American literature, not merely the courses which he/she has taken. A reading list of primary works designed to help the M.A. with Writing Option helpful when they are seeking teaching positions.

A. A minimum of 36 quarter hours beyond the B.A. degree.
- a. 12 hours at the 6000 level.
- b. 12 additional hours at the 5000-6000 level.

2. Students in the M.A. with Writing Option program may choose one of the following writing projects:

- a. A thesis, using research to analyze some aspect of writing or rhetorical theory, for which 9 hours credit is given.

3. A final examination. A candidate presenting a thesis or creative project must pass a one-hour oral examination, consisting of questions covering the general history and interpretation of English and American literature, not merely the courses which he/she has taken. A reading list of primary works designed to help the M.A. with Writing Option helpful when they are seeking teaching positions.

4. Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:

- a. The completion of a second year of language at college level with a grade of C or better.
- b. The completion of French 3020 or German 3020 at UTK with a grade of B or better.
- c. The passing of the regular Ph.D. language examination as currently administered at UTK.

For the degree of Master of Arts in College Teaching (MACT) the requirements include

1. A 45 quarter hours of course 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

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writing, specialize in teaching writing courses at the college level, or work as professional writers in business or industry. Students who go on to complete the Ph.D. may also find the M.A. with Writing Option helpful when they are seeking teaching positions.

1. A minimum of 36 quarter hours beyond the B.A. degree.
- a. 12 hours at the 6000 level.
- b. 12 additional hours at the 5000-6000 level.

2. Students in the M.A. with Writing Option program may choose one of the following writing projects:

- a. A thesis, using research to analyze some aspect of writing or rhetorical theory, for which 9 hours credit is given. A collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose would be acceptable.

3. A final examination. A candidate presenting a thesis or creative project must pass a one-hour oral examination, consisting of questions covering the general history and interpretation of English and American literature, not merely the courses which he/she has taken. A reading list of primary works designed to help the M.A. with Writing Option helpful when they are seeking teaching positions.
4270 Advanced Poetry Writing (3) Further development of general development and basic texts of Scien-

tage fiction. Recommended prerequisite: 3450-70 or consent of instructor.

4270 Advanced Poetry Writing (3) Further development of general development and basic texts of Scien-

tage fiction. Recommended prerequisite: 3450-70 or consent of instructor.

4310-20-30 The British Novel (3, 3, 3) 4310—

Deleuze to Jane Austen. 4320—Scott to Thackeray. 4330—George Elliot to Galsworthy. 4340—James Joyce to present.

4440 Sociolinguistics (3) Exploration of language patterns in terms of correlations between them and their social context. Examination of effects of language upon culture, and vice versa. Prereq: 3330 or consent of instructor. (Same as Linguistics 4460.)

4450 Dialectology (3) Theories and methodologies of dialect research, fieldwork, and analysis. Prereq: 3340 or consent of instructor.

4455 Varieties of English (3) Theories, methodolo-
gies, and findings of English and American dialectology. Prereq: consent of instructor.

4680 American Humor through Mark Twain (3)

1871-41 Ballad and Folktales (3, 3, 3) 4721—

Study of traditional English and Scottish popular ballads and their North American variants. 4731—Study of native American ballad and folktales; 4741—The folk narrative; functions, categories, and patterns of storytelling.

4850 Milton (3) Emphasis on major poems. A

4860 Seventeenth-century Prose and Poetry (3) Bacon and Donne to Marvell. A

5000 Thesis (1-19) P/NP only. E

5002 Non-Thesis Graduation Committee (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 requirements are completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5101 Foreign Study (1-12) See page 103. E

5102 Off-campus Study (1-12) See page 103.
two-thirds of the total hours in the graduate program must be at or above the 5000 level, and must include 5100 (at each offering during residency), 5150, 5160 and 6 quarter hours at the 5000 level. In no case may more than 9 hours be thesis courses. A final examination is required in both programs.

**THE DOCTORAL PROGRAM**

The doctorate is a research degree and is granted only to those persons who demonstrate proficiency in a written independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. Course requirements for the degree shall be determined and on student's faculty committee in accordance with specific interests and needs. The program of study must include sufficient course work within the department, but outside the areas of specialization, to give a broad foundation and understanding of the discipline. The program must include 5160, 5170, 5720, and (at each offering during residency) 5100. A minimum of 15 hours of credit must be earned in related fields outside the department. Competence in a foreign language, cartography, and quantitative techniques is required. Other techniques pertinent to the student's areas of specialization may be required. The language will be French or German unless otherwise approved by the student's faculty committee. Comprehensive examinations required for admission to candidacy shall include a written comprehensive, written examinations on two special fields, and an oral examination on the student's program, the special fields, and the dissertation proposal. Also required is a final oral examination which shall determine and on other aspects of the program as determined by the student's doctoral committee.

3410 Intermediate Economic Geography (4) Concepts, theories, and practices in location planning. Locational patterns in agriculture, manufacturing, and service activities. F or W

3430 Urban Geography (4) Concepts and theories concerning development and significance of systems of cities and internal morphology of cities. F or W

3450 Rural Geography (4) Geographical appraisal of rural areas of the United States, including small towns and urban fringes. Problems and potentials of rural America. F or W

3490 Geography of Resources (4) Study of factors related to the variations in resource availability from time to time and from place to place, with particular emphasis upon energy and metallic resources. F or Sp

3520 Climatology (4) General circulation system related to variations in resource availability from time to time and from place to place, with particular emphasis upon energy and metallic resources. F or Sp

3530 The Land-Surface System and Man (4) Nature and regional variations in relationships among social, economic, and cultural land systems. F or W

3610 Political Geography (4) Importance of geog- raphy in understanding political relationships within and among nations; spatial implications of political decision-making processes; geography of administrative units. F

3960 Cultural Geography (4) Basic concepts of culture; methods and approaches of cultural geography; world patterns of cultural phenomena. Sp

3790 Geography of Middle America (4) Covers Mexico, Central America, and the West Indies. F

3800 Geography of South America (4) W

3870 Geography of Asia (4) A survey of the physical, cultural, and economic characteristics of the countries of Asia, excluding the Soviet Union. W

3910 Regional Geography of United States and Canada (4) Major physical, economic, and social distributions and their relation to give distinctions of character to regions of United States and Canada. F

3920 Geography of the American South (4) Geographical appraisal of southeastern United States, including physical environment and human resources. Origin and development of contemporary economic and cultural traits of the area. W

3940 Geography of Appalachia (4) Interrelation of physical, economic, and social patterns and their relation to give distinctive character to the region and its parts, especially Southern Appalachia. Appalachia in perspective in the current American scene. F

4075 Geography of Transportation (4) Geographic examination of transportation systems, emphasizing transport of people on highways and by public facilities. Relationship of these systems to changing geography of cities and urban hinterlands. Sp

4100 Quantitative Methods in Geography (4) Geographic examination of transportation systems, emphasizing transport of people on highways and by public facilities. Relationship of these systems to changing geography of cities and urban hinterlands. Sp

4210 Problems in Geographic Method (4) Examples of problems and approaches in geographic analysis and synthesis. Emphasis on character of geographic data, generalizations, and classification, regionalization, and questions of scale. F

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. Sp

4510 Principles of Geomorphology (4) (Same as Geology 4510.)

4550 Geography of Soils (4) Soils as physical systems and their relationship to environment. Investigation of specific cases of the role of soil in management of environmental systems. F

4710 Cartographic Design and Production (4) Principles and practices of design, construction, and reproduction of maps. Recommended prereq: 3700; 2 hrs and 2 labs.

4720 Data Mapping (4) Automated techniques of representing surfaces, using geographic information systems. Recommended prereq: 3700 and knowledge of a computer language. F

4730 Advanced Cartography (4) Map production from design through color proofs. Prereq: 3700, 4710, and 4720 or consent of instructor. Sp

4740 Remote Sensing: Types and Applications (4) Basic principles and uses of aerial photography and other remote sensing techniques. Emphasis upon values of various types of imagery for geograph interrelationships and simple mapping. Prereq: Consent of instructor. F or Sp

4750 Interactive Computer Graphics (3) (Same as Computer Science 4750.)

4799 Practicum in Cartography/Remote Sensing (2-6) Prereq: Written consent of instructor required prior to registration. May be repeated. Maximum 6 hrs. E

5000 Thesis (1-15) P/N/P only. E

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

5100 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration at each offering required of resident graduate students. May be repeated. Maximum 8 hrs. S/C only. W, Sp

5101 Foreign Study (1-12) See page 103. Prereq: Written consent of instructor prior to registration. E

5102 Off-campus Study (1-12) See page 103. Prereq: Written consent of instructor prior to registration. E

5150 Introduction to Geographical Research (3) Aims of geographical research; survey of printed source materials; practice in effective presentation of research findings. F

5160 Research Design and Field Problems (4-6) Development of research problems, preparation of appropriate study designs, and practical field application. Su

5170 Geographic Concept and Method (3) Traditional and modern thought regarding nature, scope, problems, and methods of geography. A

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 registering for course. Prereq: Written consent of instructor prior to registration. May be repeated with consent of instructor. E

5250 Topics in Historical Geography (3) Examination of trends, concepts and methods in historical geography. Prereq: 4240 or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5260 Advanced Cultural Geography (3) Geographic analysis of rural settlement in Eastern United States, with emphasis on the Middle Atlantic, New England, Tidewater East, and Upland South, and specific application to Southern Appalachians. Includes field work and final paper. Prereq: 3680 or consent of instructor. A

5310 Topics in Regional Geography of the United States (3) Intensive analysis of problems and trends in one or more regions of United States, excluding American South. May be repeated with consent of instructor. Maximum 9 hrs. A

5320 Topics in the Geography of the American South (3) Geographic perspective on economic and cultural aspects of southeastern United States. Topics vary. May be repeated with consent of instructor. Maximum 9 hrs. A

5410 Advanced Topics in Economic Geography (3) Examination of trends, problems, and methods in modern economic geography. Prereq: 3410 or consent of instructor. May be repeated. Maximum 9 hrs. A

5420 Advanced Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq: 3430 or consent of instructor. A

5550 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methods in geography of land-surface system. Prereq: 3550 or consent of instructor. May be repeated with consent of instructor. A

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. A

5650 Advanced Political Geography (3) Geographic consequences of public decisions, emphasis on understanding modern administrative and political processes affect public land management, spatial distribution of public goods, and urban morphology. Prereq: 3610 or consent of instructor.

5710 Seminar in Geography (3)

5720 Topics in Quantitative Geography (3) Multivariable economic systems, applications of computer technology and computer programs; usefulness to geographic research. May be repeated with consent of instructor. Prereq: 4100 or consent of instructor. Sp

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. A

5790 Topics in Cartography (3) Trends, concepts, problems, and methods in cartography. Prereq: 4730, or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5799 Advanced Practicum in Cartography-Remote Sensing (2-4) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5915 Regional Geomorphology (4) (Same as Geol. 5915.)

6000 Doctoral Research and Dissertation (2-15) P/NP only, E

6110-20 Seminar in Economic Geography (3, 3) A

6220-30 Seminar in Urban Geography (3, 3) A

6240-50 Seminar in Historical Geography (3, 3) A

6260-70 Seminar in Cultural Geography (3, 3) A

6310-20 Seminar in Rural Geography (3, 3) A

6410-20 Seminar in Regional Geography of the United States (3, 3) A

6610-20 Seminar in Regional Geography of Latin America (3, 3) A

6710-20 Seminar in Physical Geography (3, 3) A

NOTE: Registration in 6000-level courses may be repeated with consent of department.

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours including at least 21 hours in courses numbered above 5000. A minimum of 24 hours in graduate courses, in addition to thesis, is required. 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.

c. Courses (minimum of 6 hours) at 6000 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.

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. A

3210-20 Invertebrate Paleontology (4, 4) Systematic review of important Mesozoic invertebrate fossil groups. 3210—Porifera to Annelida, including echinoderms, chelicerates, and cephalopods. 3220—Mollusca through lesser Chordata, including arthropods and echinoderms. May be taken separately or in sequence. Prereq: 3210 or consent of instructor. 3 hrs and 1 lab or field period.

3260 Paleobiology (4) Introduction to principles and materials of paleontology as applied to interpretation of fossil record. Prereq: 1210-20 or consent of instructor. 3 hrs and 1 lab or field period. A

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. A

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. Prereq: 3190. Coreq: 3190. 3 hrs and 1 lab. A

3330 Geology of East Tennessee (4) Lectures and field excursions. Prereq: 12 hrs of geology and consent of instructor. 12 hrs and 1 lab. A

3360 Stratigraphy-Sedimentation (4) Introductory study of stratigraphic principles and practices and of sedimentary processes and interpretation of depositional environments. Prereq: 3190 and 3190. 3 hrs and 1 lab or field period. A

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 se
5332 Quaternary Paleoecology (4) Perturbation, by climatic change in conjunction with glacial, periglacial, fluvial, and eolian processes; regional phenomena directly or indirectly influenced by Pleistocene glaciation. Prereq: 1410 or equivalent. (Same as Geography 4510.) 3 hrs and 1 lab.

5331 Quaternary Geology of North America (4) Development of quaternary landscapes as influenced by continental drift and plate tectonics; regional approaches to interpretation of physical and biological processes operating on or near earth's surface; application of current literature, including geochemistry of natural waters, weathering reactions, and early sediment diagenesis. Prereq: Chemistry 1110-20; Chemistry 1120 may be coreq. with consent of instructor. Recommended prereq: 5650. 3 hrs and 1 lab/sem.

5960 Cathodoluminescence Petrography (2) Application to geological problems. Prereq: 3180 and 4550 or consent of instructor. 1 hr and 1 lab.

5710 Advanced Paleontology (4) Fossil invertebrates.

5720 Paleontological Nomenclature and Techniques (4) Classification of biologic nomenclature as it applies to wild life and Geology. Prereq: 5700 and 5650. 3 hrs and 2 labs.

5800 Process Geomorphology (4) Gradational processes, and subjects of general interest. Registration required each quarter except summer for resident full-time graduate students. S/NC only.

5840 Clay Mineralogy (4) Origin of clay minerals; structures and properties; applications of mineralogical techniques in clay mineral studies. Prereq: 3180 and 5630 or equivalent. 2 hrs and 2 labs.

5850 Thermodynamics for Geologists (3) Principles of thermodynamics related to geological processes. Prereq: Chemistry 1110-20 and calculus of a single variable or equivalent.
Students must show a fluent command of German, both oral and written, and a knowledge of two foreign languages, French and another language, such as Italian, Latin or Russian, appropriate to the field of research. A comprehensive examination, both written and oral, on German language and literature and the minor field or fields, must be passed before the student may be admitted to candidacy. The student will be examined on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. 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.

3010-20-30 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. E

3210-20-30 German Literature in English Translation (3-4, 3-4, 3) No 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. F, W, Sp

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. Su

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. Su

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) or equivalent. May be repeated. W

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. W, Sp

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, 3510-20-30, 3310) or equivalent. E

4250 Introduction to Descriptive Linguistics (3) (Same as French, Russian, Spanish, and Linguistics 4250) F

4260 Introduction to Historical and Comparative Linguistics (3) Linguistic change, protolanguages, Phonological and morphological change. Cultural, historical, sociological influences upon the development of language. Dictionary: lexicography. All these topics copiously illustrated by selected examples from the 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, Spanish, and Linguistics 4260.) W

4270 Introduction to Germanic Linguistics (3) Phonetics and phonemics of German. German grammar and vocabulary (descriptive point of view. Dialects of German. Other Germanic languages.

4310-20 History of German Language (3, 3)

4630 German Civilization (3) Prereq: Intermediate German or equivalent.

4810-20-30 Advanced Conversation and Composition (3, 3, 3) Prereq: 3810-20-30 or equivalent or consent of department. F, W, Sp

5000 Thesis (1-15) P/NP only. E

5100 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

5101 Foreign Study (1-12) See page 103. E

5160 Introduction to German Semantics (3)

5200 Proseminar (3) Bibliography; methods; illustrative problems; preparation of papers. F

5210-20-30 College Teaching of German (1, 1, 1) Required of all M.A., MACT, or Ph.D. candidates, except those whose previous teaching experience warrants exemption from this requirement or who wish to pursue vocations other than teaching. F, W, Sp

5410-20-30 Medieval German Language and Literature (3, 3, 3) 5410—Introduction to Middle High German: 5420-30—Readings in Medieval German Literature. F, W, Sp

5500 Studies in German Literature (3) Content varies. May be repeated. Maximum 9 hrs. Su

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 (1899-1945) (3)

5590 Modern German Literature (1945-Present) (3)

5600 German Literary Theory and Criticism (3) W

5610-30-40-50-60 Directed Readings in German Language and Literature (3, 3, 3, 3, 3) E

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 saga as literary genre.

5730 Readings in Old Norse Poetry (3) Intensive reading of Old Norse poetry as a literary genre and re-ponsibility of ancient Germanic customs, legends, and mythology.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6100 Gothic (3) Phonology, morphology, and syntax of Gothic language. Relationship to Indo-European languages and other Germanic languages. Readings from Gothic Bible.

History

MAJOR

DEGREES

History

M.A., Ph.D.

Professors:

J. Morrow (Acting Head), Ph.D. Pennsylvania;

P.H. Beigun, Ph.D. Vanderbilt;

E. V. Chimeliak, Ph.D. Harvard; R. E. Duncan,

Ph.D. California (Berkeley); L. P. Giel, Ph.D.

Harvard; A. G. Haas, Ph.D Chicago; Y. P. Hao,

Ph.D. Harvard; R. W. Haskins (Emeritus), Ph.D.

California (Berkeley); C. O. Jackson, Ph.D. Emory;

M. M. Klein, Ph.D. Columbia, R. G. Landen, Ph.D.

Princeton.

Associate Professors:

S. D. Becker, Ph.D. Case-Western Reserve;

J. D. Bing, Ph.D. Indiana; J. Bohaleid, Ph.D.

Harvard; J. R. Finger, Ph.D. Washington;

C. W. Johnson, Ph.D. Michigan; P. A. Mars, Ph.D.

Harvard; M. J. McDonald, Ph.D. Pennsylvania;

J. Muldowny, Ph.D. Yale; P. J. Pinchney, Ph.D.

Vanderbilt; E. J. Emory; J. G. Utley, Ph.D. Illinois;

W. B. Wheeler, Ph.D. Virginia.

Assistant Professors:

J. R. Farr, Ph.D. Northwestern; W. W. Farris, Ph.D.

Harvard; C. T. Fry, Ph.D. Duke.

THE MASTER'S PROGRAM

Plan I: Course requirements include History

5240 and 5270; one M.A. reading course; at

least 6 additional hours 5300 or above of

which 3 hours must be 6300 or above. Total

hours, including thesis—45.

Plan II: History 5240, and 5270; two M.A.

reading courses; 12 additional hours 5300 or

above, at least 2 of which must be 6300 or

above. Total hours—45.

M.A. IN HISTORY WITH A CONCENTRATION

IN HISTORIC PRESERVATION

The option in historic preservation is a non-thesis

program. Students will be examined in two fields,

historic preservation, and either American history

to 1815 or American history since 1879. A student

is required to take two M.A. readings courses:

5215 or 5216 and 5225.

Total hours 47, 26 outside the History

department and 21 within.

THE DOCTORAL PROGRAM

1. Admission: (a) Acceptable scores on the

Graduate Record Examination (General

Aptitude and History Achievement).

(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 reviewed

and approved 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 a minimum of 75 credit

hours in course work is required, of which

less than 45 must be in courses that are

required to take two M.A. readings courses:

5215 or 5216 and 5225.

Total hours 47, 26 outside the History

department and 21 within.

3. Language Requirements: Candidates

must possess a reading knowledge of one

foreign language and such additional

languages as may be determined by the

student's committee. Under normal

circumstances, those specializing in

European history will need two languages.

The committee may also specify any other

research tools, such as statistics, essential

for the student's preparation. Upon student

petition, the committee may accept in place of

a language a B or better performance in

appropriate statistical courses and History

5290.

The foreign language requirement 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 form 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. Comprehensive Examination and

Committee: Incoming students will be advised

by the department head.

The comprehensive examination must be

taken after all course work is completed.

Language requirements fulfilled, and at least

nine months before the degree is expected.

This exam should normally be taken before

beginning the ninth quarter of work toward the

dissertation. 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, 1641-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 States

(11) Social and Cultural History of the

United States

(12) The South

(13) Frontier and Westward Movement

(14) Afro-American

The comprehensive examination 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.
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. The course work must include:
   a. 36 hours of mathematics courses numbered 3050 or above.
   b. 3 hours of additional work from mathematics courses numbered 3050 or above or from courses in other 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 and for teaching 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 hours must be earned along with 36 additional hours of work in acceptable courses numbered above 4000. Of the additional hours, 9 must be in an area outside the department and 21 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, 30 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 (5990-5995) 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 15 graduate credit in mathematics 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 departmental requirements:
1. Pass written examinations covering four subjects, at least three of which must be from the following list:
   a. Algebra 5510-20-30
   b. Functions of a Complex Variable 5110-20-30
   c. Topology 5910-20-30
   d. Functions of a Real Variable 5210-20-30
   e. Linear Analysis 5250-60
   f. Partial differential equations 5450-60-70
   g. Ordinary Differential Equations 5870-60-90
   h. Numerical Mathematics 5655-65-75
   i. Mathematical Statistics 5750-60-70
   j. Students may not take examinations in both d. and e. nor may they take examinations in both f. and g. as their comprehensive examination subjects. Those students who choose four from this list must choose two from a, through e. and the students who choose only three from this list must choose one from a. to e.

A student selecting only three from the above list will also be required to pass a written exam on an area of applied mathematics (e.g., Flows, Elasticity, Mathematical Ecology) approved as an examination topic by the Graduate Committee and the Applied Mathematics Committee. For a given student and a given area, the Graduate Committee will appoint a section of faculty whose responsibility is to submit a list of topics and references to the Graduate Committee and the Applied Mathematics Committee for its approval.

A student may take as many of the written examinations as desired at any time these exams are given subject to the following conditions:
1. The exams to be taken must be approved in advance by the student's supervisory committee.
2. At most 4-n exams may be taken at any one time, where n denotes the number of exams previously passed by the student.
3. A student may take a collection of written examinations a maximum of four times; but no one failing five exams, counting possible repetitions, will be permitted to take another round of exams.
4. Pass an intensive exam in the field of specialization. This exam will be given by a committee appointed by the department head at some time after the requirements in 1. have been met. A student may take this specialty exam only twice.
5. The conditions for the doctoral degree are to include a demonstrated proficiency in one foreign language, normally from among French, German, or Russian; this requirement is to be met prior to the examination in the area of specialization. The student’s doctoral committee may require that the student pass a second language exam.

In addition, the department requires that each student take a year, 6000-level course in mathematics outside of his/her area of concentration. The use of the course selected to fulfill this requirement must be approved by the department head and the student’s Dissertation Committee. Such approval may occur after completion of the course.

The written exams mentioned in 1. are normally given twice each year, once in the fall and once in the winter. The fall exams usually are given during the fall quarter, and the winter exams are given early in January.

Note: Math 3050, 3060, 3090, 3100, 3110, 3310, 3320, 3330, 3350, 3510, and 3720, are intended primarily for students preparing to teach in elementary or secondary schools. Any 3000 or 4000 course in the department whose course number ends in “zero” may be offered as an honors version. In this case, the last digit will be replaced by the letter “H” and the title will be preceded by the word “Honors” both in the timetable and on the student’s transcript. Honors versions of courses listed in the Graduate Catalog are acceptable for graduate credit. Such courses may be offered upon the initiative of interested faculty, students, or the department head (though in all cases subject to the approval of the department head).

3500 Elementary Probability and Statistical Analysis (3) Combinatorial problems; sample spaces; set operations; probability axioms; independence; axiomatic probability theory; random variables and their distributions; simple random processes. Does not satisfy requirements of minor or major in mathematics. Prereq: 1550 or consent of instructor. W, Sp

3650 Elementary Statistical Analysis (3) Elementary probability distributions used in statistics: binomial, Poisson, and normal and their properties; sampling theory; confidence intervals; statistical tests of hypotheses; least squares and linear regression. Does not satisfy requirements of major or minor in mathematics. Prereq: 3650 or consent of instructor. Sp, Su

3090 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 given to certain ring theoretic properties shared by integers and polynomials. Prereq: or coreq: 3100 or consent of instructor.

3100 Logic and Sets (3) Elements of mathematical logic; elementary algebra of sets. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics. Prereq: 1 yr college mathematics.

3110 Real Number System (3) Laws of arithmetic; rational and irrational numbers; fields. Prereq: 1 yr of college mathematics. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics.


3150 Introduction to Numerical Algorithms and Programming (3) (Same as Computer Science 3156.) E

3155 Introduction to Numerical Algorithms (3) (Same as Computer Science 3155.) E

3215 Discrete Structures II (3) (Same as Computer Science 2215.)

3220 History of Mathematics (3) Survey of development of various branches of mathematics, from ancient to modern times. Prereq: 1860 or 2550 or equivalent.

3310 Advanced Euclidean Geometry (3) Triangles and circles, constructions, modern concepts. Prereq: 1 yr of college mathematics. F

3320 Non-Euclidean Geometry (3) Foundations of geometry. Elliptic and hyperbolic plane geometry. Prereq: 1 yr of college mathematics. W

3330 Transformational Geometry (3) Fundamental transformational concepts of geometry. Classifications of isometries and similarities; symmetries of a polygon; inversions. Prereq: 1 yr of college mathematics.

3510 Internship in Analysis for Teachers (3) Primarily for students in secondary mathematics education. Course covers elementary calculus from advanced viewpoint with emphasis on proofs of basic theorems. Topics covered include limits of sequences and functions, continuous functions, derivates, definite integral, and fundamental theorem of integral calculus. Does not satisfy requirements of major or minor in mathematics. Prereq: 1550-60 or 1860. Su


3780-90 Introduction to Combinatorial Theory (3, 3) Introduction to problems of arrangement and
128 College of Liberal Arts/Mathematics

**3810 How To Prove It** (3) Course is designed to introduce students to fundamental methods of mathematical proof by means of practice and participation in seminar setting. Variable content but will include material such as elementary set theory, relations and functions, and mathematical induction. Coreqs: 2850 or 2560.

**3861 Mathematical Models in the Life Sciences (3)** Introduction to difference equations and differential equations. Mathematical modeling techniques applied to biological phenomena. Does not satisfy requirements of major or minor in mathematics. Prereq: 1841-51 or consent of instructor.

**3920-30 Topology of Euclidean Spaces (3, 3)** Topics will include topology of line and plane, separation properties, compactness, connectedness, and partitions of the plane. Examples include, homoeomorphisms, continua, and topological invariants. Must be taken in sequence. Prereqs: 3810, 2868, or consent of instructor. W, Sp.

**3990 Studies in Mathematics (1-4)** Credit determined at registration. Prereq: Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

**4050-60 Matrix Algebra and Applications (3, 3)** Vector spaces, linear transformations, eigenvalues and eigenvectors, similarity and unitary transformations, singular value decomposition and least square problems. Prerequisites: linear and matrix norms. Jordan canonical form, evolution of discrete and continuous systems, quadratic forms and variational principles, related topics. Must be taken in sequence. Prereq: 2960.

**4070 Matrix Algebra and Applications (3)** Topics to be chosen at discretion of instructor. Prereq: 4050-60.

**4120 Linear Algebra (3)** Abstract vector spaces, linear transformations, and their matrices, systems of linear equations and determinants, inner products, and diagonalization of symmetric matrices. Prereq: 2860 or 4050. F.

**4150-60 Abstract Algebra (3, 3)** Equivalence relations and partitions, priority systems of integers, elementary theory of groups and rings, polynomial rings, integral domains, divisibility, unique factorization domains, and fields. Must be taken in sequence. Prereq: 2860. W, Sp.

**4225 Numerical Solution to Equations and Numerical Approximations (3)** Numerical solution to equations and numerical approximations. Introduction to numerical methods for solving equations. Solution of a single nonlinear equation; introduction to iterative methods for linear and nonlinear systems. Polynomial approximation and inverse power methods for eigenvalues. Approximation by polynomials, piecewise polynomials, trigonometric and rational functions. Prereqs: 3150 or 3152. (Same as Computer Science 4225.) F, W.


**4540 Infinite Series and Functions of Several Variables (3)** General theory, power series and Taylor formula, uniform convergence. Partial differentiation and maxima and minima for functions of several variables. LaGrange multipliers. Prereq: 2800.

**4550 Partial Differential Equations (4)** Fourier series, Fourier integrals, orthogonal functions; the vibrating string; solution by series; heat flow. Bessel functions. Prereq: 2860. Recommended: 4610 or 4710. E.


**4640 Calculus of Finite Differences (3)** Real difference equations, application to problems in engineering and physics. Prereq or coreq: 4470.


**4710 Vector Analysis (3)** Fundamental operations, basis vectors, dot and cross products, directional derivatives, divergence and curl of vector fields, line and surface integrals, divergence theorem of Gauss, and Stokes' theorem. Does not satisfy requirement of major or minor in mathematics. Prereq: 2860. E.


**4810 Elementary Number Theory (3)** Divisibility; congruences; theorems of Fermat and Wilson, primitive roots, indices, quadratic reciprocity. Prereq: 2860 or consent of instructor. E.

**4990 Readings in Mathematics (1-3)** Open to superior students with consent of department head. Independent study with faculty guidance. May be repeated. Maximum 8 hrs. Prereq: 2860 or consent of instructor.

**4980 Studies in Mathematics (1-4)** Credit determined at registration. Prereq: Recommendation of Mathematics Department faculty member and consent of department. May be repeated. Maximum 9 hrs.

**5000 Thesis (1-15)** P/NP only. E.

**5002 Non-Thesis Graduation Completion (3-15)** Required for the non-thesis student not otherwise registered during any quarter when such a student wishes to graduate. May not be used toward degree requirements. May be repeated. S/NC only. E.

**5010 Elementary Functions from an Advanced Standpoint for Teachers (3)** Advanced techniques applied to graphing functions. Curves, surfaces, parametrizations, singular points, tangent lines and tangent planes, osculating planes, arc length of curves in plane and curves on surface, curvature, torsion, asymptotes, local coordinates. Prereq: 3150 or 3110 or consent of instructor.

**5012 Differential Geometry for Teachers (3-4)** Advanced techniques applied to graphing functions. Curves, surfaces, parametrizations, singular points, tangent lines and tangent planes, osculating planes, arc length of curves in plane and curves on surface, curvature, torsion, asymptotes, local coordinates. Prereq: 1 yr of calculus, or consent of instructor.

**5013 Geometry for Teachers (3-4)** Primarily for high school teachers of geometry, historical and modern presentations of topics encountered in a high school geometry class: axioms, synthetic and metric; models; betweenness; congruence of segments and triangles; parallel postulate; similarity; area; ruler and compass constructions; Klein's Erlangen program. Prereq: Consent of instructor.

**5014 Analysis for Teachers (3-4)** Functions of several variables, vectors, limits and continuity, partial derivatives, directional derivatives and gradient, implicit function theorem, maxima and minima, transformation of variables. Prereq: 5120.

**5015 Probability and Statistical Inference for Teachers (3-4)** Probability distributions including binomial, hypergeometric, and Poisson, moment generating functions, expectation of continuous random variables; moment generating functions of uniform and normal distributions. Sampling including Chi-square, F, and t distributions; interval estimation of means and variances; simple hypothesis testing. Prereq: 1 yr of calculus and 3050 or consent of instructor.

**5051 Introductory Business Mathematics (3)** Graphs of simple equations, straight lines, circle, parabola, functions, algebra of functions, limits, continuity, derivatives of algebra functions, applications to maxima and minima, convexity and concavity, implicit differentiation, chain rule, higher derivatives, and applications. Credit available only to satisfy MBA core requirement. Prereq: Math 1550 or equivalent.

**5052 Mathematics for Business Decisions (3)** Exponential function, applications to growth and decay models, antiderivatives, integration as area, fundamental theorem of calculus, method of substi- tution, integral tables, integration by parts, Simpson's rule, numerical integration and application, integration over simple regions, applications, introductory matrix algebra, applications and interpretations. Credit available only to satisfy MBA core requirement. Prereq: Math 5045 or equivalent.

**5110-20-30 Theory of Functions of a Complex Variable (3, 3, 3)** Complex numbers; infinite series; analytic functions; conformal mapping; analytic continuation; special functions. Prereq: 4510-20 for 5110; 4530 for 5120. Must be taken in sequence. F, W, Sp.


functions and functions of bounded variation, Radon-Nikodym theorem. Hahn-Jordan decomposition, product measures and Fubini theorem. F, W, Sp, A


5775 Combinatorial Algorithms (3) (Same as Computer Science 5775.)

5810-20-30 Number Theory (3, 3, 3) Arithmetic functions, distribution of primes, Diophantine equations, approximation theory, Shirelmam density and Mann's theorem, quadratic forms, Dirichlet's theorem, prime number theory. Prereq or coreq: 5510 for 5610; 5520 for 5620.

5840-50-60 Mathematical Ecology (3, 3, 3) Discrete and continuous models in ecology. Population, community, and ecosystem models from a qualitative modeling perspective. Physical environmental modeling effects in ecosystems. Specific ecosystem models; predator-prey, competition, parasite-host, food chains, and food webs. Stochastic growth models, meteorological effects. Comparison of stochastic with deterministic models. Prereq for 5840-50: 4610, 4500 or consent of instructor; for prereq for 5860: 4750 or 4650 or consent of instructor.


5910-20-30 Elementary Topology (3, 3, 3) Topological spaces; metricization, homeomorphic invariants of point sets; structure of Peano continua. Mapping; homotopy. Introduction to combinatorial topology. F, W, Sp, A


5990 Graduate Reading in Mathematics (1-3) Open to graduate students with consent of department head. Independent study with faculty guidance. May be repeated. Maximum 5 hrs.

5991 Seminar Analysis (1-3)

5992 Seminar Topology (1-3)

5993 Seminar Algebra (1-3)

5994 Seminar Foundations (1-3)

5995 Seminar Applied Mathematics (1-3) May be taken for S/N or letter grade.

NOTE: Registration for seminars may be repeated with consent of department.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E


6450-50-60 Partial Differential Equations (3, 3, 3) Advanced topics in analytical 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, 3) Intensive study of one major branch of algebraic theory. Subject matter will vary according to interests and preparation of students. Prereq: 5510-20-30.

6570 Theory of Groups (3) Structure of groups, free groups, nilpotence and solvability, extensions and products, permutation groups, abelian groups. Prereq: 5250.

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 and preparation of students. Prereq or coreq: 2610 or 4610. 4150-60, and 5110-20-30 or 5210-20-30 or consent of instructor.


6810-20-30 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.

6840-50-60 Introduction to Algebraic Topology (3, 3) Homology, cohomology, and homotopy theories. Homology and cohomology groups, the Eilenberg-Steenrod axioms, cup and cap products, duality, Lefschetz theory, homology equivalence, higher homotopy groups, fiber spaces, spectral sequences. Prereq: 4160 and 5920.

6991 Seminar Analysis (1-3)

6992 Seminar Topology (1-3)

6993 Seminar Algebra (1-3)

6995 Seminar Applied Mathematics (1-3)

6996 Seminar in Numerical Mathematics (1-3)

NOTE: Registration for 6000-level courses may be repeated with consent of instructor.
Microbiology

MAJOR

DEGREES

Microbiology

M.S., Ph.D.

Professors:

A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; R. J. Courtney, Ph.D. Syracuse; T. C. Monte, Ph.D. Massachusetts; W. W. Y. Y. Yang, Ph.D. Yale; B. T. Rouse, Ph.D. Geuel (Canada); J. M. Woodward (Emeritus), Ph.D. Kansas; C. J. Wust, Ph.D. Indiana.

Associate Professors:

D. A. Rains, Ph.D. Cornell; D. A. Brian, Ph.D., D.V.M. Michigan State; G. S. Sayler, Ph.D. Idaho.

Assistant Professors:

R. N. Moore, Ph.D. Texas (Austin); K. M. Skolkin, Ph.D. Michigan State; G. Slacey, Ph.D. Texas (Austin).

Instructors:

H. F. Adler, Ph.D. Cornell; B. B. Bellomy, M.D. Georgetown; W. Parkas, Ph.D. Duke; C. L. Lozio, M.D. Buenos Aires.

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 (3) Standard methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Prereq: 2910 or 3700 and Chemistry 2230 or 3211. 15

3819 Food Bacteriology Laboratory (2) Laboratory methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Prereq. 2919 or 3519. Coreq. 3810. 15

3820 Yeast and Molds (3) Morphology, taxonomy, and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq. 2910 or 3700, or consent of instructor. W

3829 Yeasts and Molds Laboratory (2) Laboratory methods for examination and cultivation of yeasts and molds. Prereq: 2919 or 3519. Coreq. 3820. W

4110 Physiology of Bacteria (3) Modern concepts of bacterial physiology and metabolism including cell structure and function. Prereq. 3700 and 12 hrs of organic chemistry, W

4119 Bacterial Physiology Laboratory (2) Prereq: 3519. Coreq: 4110. W

4130 Taxonomy of Bacteria (3) Bacterial classification. Prereq: 3700 and 3519. F

4140 Molecular Genetics (3) Transmission and expression of genetic information at the molecular level. Emphasis is on bacterial and viral systems, but unique features of eukaryotic genetic systems are included. Prereq: 3700 or consent of instructor. Sp

4149 Techniques in Microbial Genetics (2) Practical experience in basic techniques in experimental microbiology. Coreq. 4140. Sp

4150 Microbial Ecology (3) Application of ecological principles to study of microbial communities. Emphasis on functional role of microorganisms in natural environments. Prereq: 3700. 1 yr of organic chemistry, Biology 3130, or consent of instructor. Sp

4159 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. Sp

4270 Immunology (3) Principles of immunology and mechanisms of microorganism structure and theories of formation, complement, hypersensitivities, cell cooperation in immune mechanisms, abnor-

malities of the immune system. Prereq: Biology 3120. F

4279 Advanced Immunology Laboratory (2) Laboratory exercises designed to accompany 4270. Prereq or coreq: 4270. W

4320 Pathogenic Bacteriology (3) Disease producing microorganisms including bacteria, rickettsia, and chlamydia. Prereq: 3200. W

4329 Pathogenic Bacteriology Laboratory (2) Techniques for isolation, cultivation, and identification of pathogenic bacteria. Prereq: 3500. Coreq. 4320. W

4330 Medical Mycology (3) Disease-causing fungi; cytology, physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq. 3700. Sp

4339 Medical Mycology Laboratory (2) Prereq: 3519. Coreq. 4330. Sp

4420 Molecular Virology (3) Molecular aspects of the replication, assembly and expression of viruses, with emphasis on bacteriophage. Prereq: 3702. F

4430 Medical Virology (3) General virology with emphasis on medical aspects. Prereq: 3200. W

4439 Medical Virology Laboratory (2) Laboratory procedures for isolation, handling and culturing of animal viruses. Prereq: 3519. Coreq: 4430. W

5000 Thesis (1-15) P/NP only. E

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, E

5011-12-13-14-15-16 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 schizomycetes, emphasis upon less frequently encountered orders. Prereq: 4130. 3 labs.

5310 Selected Topics in Microbiological Research (3) Literature surveys and laboratory methods for development and interpretation of microbiological research. May be repeated.

5350 Advanced Microbiology for Secondary Education (3) General bacterial populations encountered in natural habitats; laboratory methods for isolation, cultivation, and characterization of naturally occurring microorganisms. Prereq: Consent of instructor and introductory course in microbiology and general chemistry. Not for degree credit in microbiology, Su

5360 Topics in Immunology and Immunocomnchemistry (4) Molecular and genetic aspects of immunoglobulin synthesis. Theoretical and practical exercise in immunobiology. Prereq: 4270, Biochemistry 4110-20 or equivalent.

5510-20-30 Research Problems (3, 3, 3) May be repeated. E

5750 Microbial Physiology (3) Lectures and seminars dealing with current advances in bacterial physiology including growth and cell structure. Prereq. 4110. Biochemistry 4110-20.

5730 Pathogenesis of Infectious Disease (3) Host resistance to infection. Derangement of host-metabolism stimulated 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.

5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetic concepts (mutation, recombination, adaptation) at molecular level. Studies of lactose operon of E. coli. Prereq: 4140 and Biochemistry 4110-20 or consent of instructor.

5910-20-30 General Seminar (1, 1, 1) Reviews of current literature. May be repeated with consent of department. S/NC only, E

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6310 Seminar in Immunology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E

6320 Seminar in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. S/NC only, E

6340 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E

6350 Seminar in Virology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E

6360 Seminar in Filamentous Fungi (1) Readings and discussions based on current literature. May be repeated. Maximum 9 hrs. S/NC only, F, W, Sp

6370 Current Topics in Environmental Microbiology (3) Reading, discussions, and critical evaluation of current literature. May be repeated. Maximum 8 hrs. S/NC only, F

6410 Concepts of Immunity (3) Discussion and readings of recent advances in immunobiology and immunopathology.

6420 Current Topics in Biological Membrane Research (1) (Same as Biochemistry 6420.) S/NC only.

6720 Advanced Topics in Microbial Physiology (3) Prereq: 5720. May be repeated with consent of department.

6730 Advanced Topics in Microbial Pathogenesis (3) Prereq: 5730. May be repeated with consent of department.

6740 Advanced Topics in Virology (3) Prereq: 4270 or 4430. May be repeated with consent of department.

6750 Advanced Topics in Microbial Genetics (3) Prereq: 5340. May be repeated with consent of department.

8610-20-30 Problem Seminar (1, 1, 1) Research problems and methods, critical analysis of experimental data and validity of conclusions. May be repeated with consent of department. S/NC only.

Music

MAJOR

DEGREES

Music

M.M., M.A.

Professors:


Associate Professors:

G. C. Bitzas, M.M. Converse; W. Bommeje, M.M. Tulsa; M. Frazee, B.M. Oberlin; P. M. Hordovsky, M.M. Manhattan Sch. of Music; D. Hough, M.M.


The Department of Music offers the degrees of Master of Music with concentrations in performance, composition, theory, choral conducting, instrumental conducting, Suzuki string techniques, and piano pedagogy and literature, and the Master of Arts with a major in Music with concentrations in theory and musicology.

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 Tennessee, Knoxville, appropriate to the prospective area of concentration on the Master's level.

Applicants who plan to pursue the degree in performance (applied music) are required to audition before the appropriate area committee. Applicants for admission to the program in composition must submit scores and tape recordings of representative works. All applicants are required to take the Diagnostic Examinations in music theory and music history and literature.

General requirements for the Master's degree begin on page 19 of this catalog.

THE MASTER OF MUSIC PROGRAM
The department requires a minimum of 45 quarter hours of coursework for the Master of Music degree. These hours are specifically distributed according to the area of concentration. All areas require coursework in music history, philosophy, and theory and allows for elective courses. Music theory and composition require a thesis. Detailed programs will be established by the student's faculty committee.

THE MASTER OF ARTS PROGRAM
The department requires a minimum of 45 quarter hours including 21 hours of coursework above the 5000 level and 9 hours of thesis. A reading knowledge of French or German must be demonstrated by candidates for the Master of Arts degree.

Specific course requirements will be prescribed by the department for all degree programs and elective courses must have the approval of the student's advisor.

3122 Oratorio (3) Choral works other than those appropriate for use in church.
3300 Flute (1-4)
3305 Oboe (1-4)
3310 Bassoon (1-4)
3315 Clarinet (1-4)
3320 Saxophone (1-4)
3325 Horn (1-4)
3330 Trumpet (1-4)
3335 Trombone (1-4)
3340 Viola (1-4)
3345 Cello (1-4)
3355 Tuba (1-4)
3359 Percussion (1-4)
3355 Piano (1-4)
3365 Piano (1-4)
3370 Violin (1-4)
3375 Viola (1-4)
3380 Viola (1-4)
3385 Harpsichord (1-4)
3390 Organ (1-4)
3395 Guitar (1-4)
3397 Composition with Electronic Media (1-3)
3400 Advanced Choral Conducting (3) Development of knowledge and skills in instrumental conducting; study of various periods and composers of styles in opera acting based on historical and national characteristics. Prereq: 3015 or consent of instructor.
3450 Advanced Instrumental Conducting (3) Development of knowledge and skills in instrumental conducting; study of various periods and composers and relationship of different styles to the conductor's art; musical analysis and practice in conducting. Prereq: Music Education 4430 or equivalent.
3500 Flute (1-4)
3505 Oboe (1-4)
3510 Bassoon (1-4)
3515 Clarinet (1-4)
3520 Saxophone (1-4)
3525 Horn (1-4)
3530 Trumpet (1-4)
3535 Trombone (1-4)
3540 Violin (1-4)
3545 Viola (1-4)
3550 Percussion (1-4)
3555 Piano (1-4)
3560 Violin (1-4)
3565 Viola (1-4)
3570 Cello (1-4)
3575 Harpsichord (1-4)
3580 Piano (1-4)
3585 Harpsichord (1-4)
3590 Organ (1-4)
3595 Guitar (1-4)
3600 Oratorio (3) Choral works other than those appropriate for use in church.
THE MASTER’S PROGRAM
The department offers both an M.A. with thesis and a non-thesis M.A. The latter is available only to students who have passed the doctoral comprehensives and are ready to begin writing a dissertation, but who have not written a Master’s thesis. See general requirements on page 18. 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 not less than 45 hours 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. Registration in any course in the 5000 or 6000 series (except 5050) 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 Philosophy or Religious Studies Departments.

3111 Ancient Western Philosophy (4) F, W
3121 Medieval Philosophy (4) F, Sp
3131 Seventeenth- and Eighteenth-century Philo-
    sophy (4) E
3141 Nineteenth-century Philosophy (4) F, Sp
3151 Contemporary Philosophy (4) Survey of re-
    cent movements in philosophy. F
3270 Russian Philosophical and Theological
    Thought (4) (Same as Religious Studies 3270
    and Russian 3270.)
3311-12 American Philosophy (4, 4) 3311—Colo-
    nial to late nineteenth century, 3312—Late
    nineteenth century to present. W, Sp
3320 Philosophy of Law (4) Nature, sources, func-
    tion of law. A
3330 Philosophy of History (4) Speculative and cr.
    itical aspects of the philosophy of history. A
3410 Philosophical Ideas in Literature (4) Philo-
    sophical discriminations and implications in major literary works. F, W, Su
3420 Philosophy of Literature (4) Study of the na-
    ture, functions, value and epistemical principles of literary arts. A
3430 The Concept of Woman (4) Nature of woman
    as conceived by major western philosophers from Plato to Simone de Beauvoir. F, W
3440 Social Ethics (4) Ethical theory as related to
    politics, economics, law, religion and the family. F
3510 Existentialism (4) E
3550 Marxism as Philosophy (4) W
3590 Business Ethics (4) Ethical problems as they
    confront both business as social institution and indi-
    viduals in business. May not be taken for graduate
    credit by philosophy majors. Sp
3605-06 Professional Responsibility (4, 4) 3605—
    Critical analysis of selected classic texts from phi-
    losophy, religious studies, and social sciences; na-
    ture of responsibility, professionalism, and applica-
    tion of concepts of responsibility to professional
    activity. Illustrations from various professional
    fields of practice. 3606—Application of theoretical
    principles and analytic skills developed in 3605 to
    professional practice from following professional
    fields: Engineering/Architecture, Business/ Ac-
    counting, and at least one of (a) Law/Psychology; (b)
    Helping Professions (Social Work, Human Services,
    Religious Ministry); (c) Teaching. (Same as Reli-
    gious Studies 3605-06.) F, W
3650 Philosophy and Religion in India (4) (Same
    as Religious Studies 3650.) F
3660 Buddhist Philosophy and Religion (4)
    (Same as Religious Studies 3660.) W
3671 Religion and Philosophy in China (4) (Same
    as Religious Studies 3671.) W
3690 Philosophy of Religion (4) Analysis of basic
    issues of religion. (Same as Religious Studies 3690.
    F, Sp, Su)
3720 Science, Technology, and the Modern World:
    A Philosophical Approach (4) Nature and
    limits of scientific inquiry, and its impact on society. F, Sp
3740-50 Conceptual History of Science (4, 4)
    3740—The Scientific Revolution historical evolution
    of thought in astronomy, mechanics and philosophy
    of nature up to Newton. 3750—The development
    and decline of Newtonian science. Historical evolu-
    tion 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. A
3770 Introduction to Philosophy of Science (4)
    Standard topics in philosophy of science: scientific
    method, nature of laws and theories, problems of
    induction, explanation, measurement. No back-
    ground in logic presupposed. F
3810 Introductory Symbolic Logic (4) Techniques
    for formal analysis of deductive reasoning (proposi-
    tional logic and quantification theory.) Sp
3910 Contemporary Aesthetics (4) Philosophical-
    discussion of contemporary art. F, W, Sp
4000 Special Topics (4) A student- or instructor-
    initiated course to be offered at convenience of de-
    partment. Subject matter to be determined by mutual
    consent of students and instructor with approval of de-
    partment. Prerequisite to be determined by de-
    partment. May be repeated. 4111-21 Modern Religious
    Philosophies (4, 4) (Same as Religious Studies 4111-21.)
4200 Classical Indian Systems of Philosophy:
    The Moksha Tradition (4) (Same as Religious Stu-
    dies 4200.)
4310 Intermediate Ethics (4) Topics in metaethics
    or ethics. Sp
4370 Theoretical Issues in Medical Ethics (4) Prereq:
    3310 or 3611 or consent of instructor. (Same as Religious Studies 4370.) Sp
4410 Plato (4) Prereq: 8 hrs philosophy or consent
    of instructor. A
4420 Aristotel (4) Prereq: 8 hrs philosophy or con-
    sent of instructor. A
4450 Continental Rationalism (4) Prereq: 8 hrs phi-
    losophy or consent of instructor. A
4460 British Empiricism (4) Prereq: 8 hrs philo-
    sophy or consent of instructor. A
4470 Kant (4) Prereq: 8 hrs philosophy or consent
    of instructor. A
4480 Advanced Topics in Existentialism and Phe-
    nomenology (4) Prereq: 8 hrs philosophy or consent
    of instructor. A
4511 Advanced Topics in Logic (4) Prereq: Con-
    sent of instructor. May be repeated.
4620 Philosophy of Mind (4) Problems of mind and
    body in relation to consciousness and personal
    identity. Prereq: 8 hrs philosophy or consent of in-
    structor. A
4630 Philosophy of Language (4) Prereq: 8 hrs philo-
    sophy or consent of instructor.
4710 Philosophy of Natural Science (4) Conside-
   ration of standard topics pertinent to natural scien-
    ce including reduction of theories and teleological
    explanation. Familiarity with symbolic logic is recom-
    mended. Prereq: 3770 or 2 yrs natural science.
4720 Philosophy of Social Science (4) Examina-
    tion of methodological and ethical issues in explana-
    tion in social sciences. Prereq: 3770 or 2 yrs social scien-
    ce.
4810 Metaphysics (4) Prereq: 8 hrs philosophy or
    consent of instructor.
5000 Thesis (1-15) P/NP only. E
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 de-
    gree requirements. May be repeated. S/NC only. E
5050 Symbolic Logic (4)
5600 Philosophy of Logic (4) Nature of logic; epis-
    temological, metaphysical and axiomatical assump-
    tions and implications in various theories of logic. Prereq: 4510 or equivalent.
5101 Foreign Study (1-12) See page 103. E
5102 Off-campus Study (1-12) See page 103. E
5103 Independent Study (1-12) See page 103. E
5110-20-30-40-50-60 Studies in the History of
    European Philosophy (4, 4, 4, 4, 4, 4) Intensive
    critical work on major philosopher or school. 5110—
    Greek. 5120—Hellenistic or Medieval. 5130—Mod-
    ern, before Kant. 5140—Kant. 5150—Nineteenth
    Century. 5160—Twentieth Century.
5250 Studies in the History of American Philoso-
    phy (4) Intensive, critical work on major philosopher or school.
5310-20-30 Studies in Value and Normative
    Theories (4, 4, 4) 5310—Axiology. 5320—Ethics
    and metaethics. 5330—Aesthetics.
5355 Orientation to Medical Ethics (2) Survey of
    ethical theories in application to issues in medical
    ethics. Consent of Medical Ethics Committee re-
    quired. (Same as Religious Studies 5355.) F
5365 Applied Ethical Theory (4) Single author,
    tradition, or topic in ethical theory with special atten-
    tion to application to issues in health, business, tech-
    nology, ecology, and other practical fields. (Same as Religious Studies 5365.) W
5370 Topics in Medical Ethics (4) Prereq: 4370 or
    consent of Medical Ethics Committee.
5375 Clinical Medical Ethics (1) Medical termino-
    logy, history of medical ethics, case study discuss,
    clinical observation. Open only to students concen-
    trating in medical ethics. Prereq: 5355 and consent of Medical Ethics Committee. May be repeated. Max-
    imum 8 hrs. S/NC only.
5410 Philosophy of History (4) Theories of history and historical processes.

5430 Philosophy and Literature (4) Mutual influence of philosophy and literature, possibility of a philosophy of literature, philosophy of criticism.

5450 The Problem of the Self (4) Current studies in sociology, social psychology, and philosophy to afford and elucidate traditional philosophical treatments of the problem of self.

5460 Philosophy of Mind (4) Relation of mental to physical and of role of words in discourse for mental activities such as thinking and feeling.

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)

5720 Studies in Epistemology (4)

5810 Social and Political Philosophy (4)

5940 Lakeshore Clinical Residence (6) Seven-week clinical practicum at Lakeshore Mental Health Institute concentrating on ethical issues in mental health care. Open only to students concentrating in medical ethics. S/NC only.

5950 Clinical Practicum in Medical Ethics (4-12) Prereg: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S. NC only.

6000 Doctoral Research and Dissertation (3-15) Prereg: P/NP only. E

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) Prereg: 5370 or consent of Medical Ethics Committee.

6510 Seminar in Epistemology (4)

6550 Seminar in Philosophy of Science (4)

6950 Advanced Residence in Medical Ethics (4-12) Prereg: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S. NC only.

**Physics and Astronomy**

**DEGREES**

**M.S., Ph.D.**

**MAJOR**

Physics

**Professors:**

W. M. Bugg (Head), Ph.D. Tennessee; C. R. Bingham, Ph.D. Tennessee; W. E. Blass, Ph.D. Michigan State; A. A. Breazeale, Ph.D. Michigan; T. A. Callcott, Ph.D. Purdue; L. G. Christorphorus, Ph.D. University of Manchester (England); G. T. Condo, Ph.D. Illinois; W. E. Deeds, Ph.D. Ohio State; J. B. Dicks, Ph.D. Vanderbilt; J. L. Fowler, Ph.D. Princeton; K. Fox, Ph.D. Michigan; N. M. Galler, Ph.D. Ohio State; S. C. Goff, Ph.D. Maryland (England); E. G. Harris, Ph.D. Tennessee; E. L. Hart, Ph.D. Cornell; P. G. Huray, Ph.D. Tennessee; H. C. Jacobson, Ph.D. Yale; D. T. King, Ph.D. Bristol University (England); R. J. L. Lowel, Ph.D. Vanderbilt; A. A. Mace, Ph.D. Pennsylvania; A. H. Nielsen (Emeritus), Ph.D. Michigan; F. E. Downshain, Jr., Ph.D. Pittsburgh; L. A. Painter, Ph.D. Pennsylvania; D. N. Portman, Ph.D. Maryland; S. L. Riding, Ph.D. Vanderbilt; R. H. Ritchie, Ph.D. Tennessee; H. C. Schwiminer, Ph.D. Massachusetts Institute of Technology; M. Stilin, Ph.D. Chicago; C. C. Shih, Ph.D. Cornell; P. H. Stelson, Ph.D. Massachusetts Institute of Technology; J. R. Thompson, Ph.D.

**Associate Professors:**

J. O. Thompson, Ph.D. Illinois; T. A. Welton, Ph.D. Illinois; J. W. White, Ph.D. North Carolina.

**Assistant Professors:**


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 3210-20-30, 3710-20-30 or 4110-20-30, 4210-20, 4230 or 4240 constitute the minimum courses required for coursework study.

A student who intends 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 course work 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, health physics, molecular spectroscopy, nuclear physics, plasma physics, solid state physics, theoretical physics, ultrasonics, heavy ion atomic physics, biophysics, and liquid state physics.

Departmental graduate programs providing special opportunities for academic research in areas of interest to physicists, such as astrophysics and space flight are available at the Space Institute, Tallahassee.

All first-year graduate students are required to take a qualifying 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, 5120-20-30, 5120-50, 5610-20-30 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 enroll under this program. The requirements for the M.S. under this method are the satisfactory completion of

45 hours of course work composed of 30 hours from courses numbered above 5000 (e.g., 5110-20-30, 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 DOCTORAL PROGRAM**

All students are expected to take 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30 and 6310. Physics 6120-20-30 are normally required of students specializing in nuclear physics, Physics 5810-20 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 molecular spectra. (The Master's degree is not required.)

A reading knowledge of one foreign language in which there exists a 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. Physics departmental 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, 5110-20-30, 5120-30, 6110-20, and either 6310 or 5720; Chemistry 4160-70, 5430, and any two courses from 5340-50, 6730 or 6810-20.8

**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; 3210-20 or consent of instructor. Sp, Su

3310-20 Electronics (3, 3) Electronic components and circuits of interest to physicists. Prereq: 3210-20-30 or 2210-20-30 and calculus. 3 labs. F, W, Su

3650 Nuclear Electronics Laboratory (3) Elementary circuits of interest in nuclear instrumentation. Design and measurement of their characteristics are tested as a function of various parameters. Prereq: 3610-20. Sp

3710-20-30 Introduction to Atomic and Nuclear Physics (3, 3) 3710—Special relativity and early
analytical skills, and management skills, a recommended internship arranged with a cooperating public agency (9 quarter hours), and 15 quarter hours in an elective specialized track developed with the approval of the coordinator of the M.P.A. program. The specialized track will often contain a mix of courses from political science and one or more outside fields, examples include general government, public health administration, fiscal administration, social services administration, administration of criminal justice, urban administration, and environmental and natural resources administration.

Inquiries concerning all programs should be directed to the Department of Political Science, Knoxville, Tennessee 37996-0410.

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 quarter hours in political science shall be graduate level hours (i.e. earned in 5000-6000 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.

3. Admission to the program will be based on a written and oral comprehensive examination 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. Note: Registration in any course in the 5000-6000 series may be repeated for credit with consent of the department.

3545 United States Constitutional Law: Sources of Power and Restraint (4) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional provision of political rights. Recommended prereq: precalculus 210-20. F, W


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. W

3565 Introduction to Public Administrative Organization and Management (4) Organization and decision-making in theory, line and staff services, politics of organization, leadership, personnel and fiscal management, administrative responsibility. Recommended prereq: precalculus 210-20. F, W, Sp


3605 Political Change in Developing Areas (4) Characteristics and problems of political changes with primary focus on developing areas. F, Sp

3615-16 Dynamics of Black African Politics (4, 4) F, W

3621 Government and Politics of the People's Republic of China (4) Chinese political setting, political structures, participation and selected policy areas. F

3625-26 Latin American Government and Politics (4, 4) F, W

3631-32 Government and Politics of the Soviet Union (4, 4) F, W

3635-36 Politics in Western Democracies (4, 4) Political culture, patterns, and institutions of Western democratic systems. F, Sp, A, W

3710 State Politics (4) Focus on formal and informal setting of state government. State government's role in formulating, enacting, and implementing state policy. F

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. W

3750 The Urban Polity (4) Analysis of political institutions and processes in metropolitan areas. W

3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas. Sp

3796 Contemporary Problems of Soviet Foreign Policy (4) Sp

3801 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought. F

3802 Studies in Medieval Political Thought (4) From Augustine to Luther: emphasis on problems and theories of religion and politics. W or Sp

3803 Studies in Early Modern Political Thought (4) Machiavelli through the Enlightenment. W

3804 Studies in Nineteenth- and Twentieth-century Political Thought (4) Political theories of industrial and technocratic societies, nineteenth and twentieth century. Sp

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. F

4060 Revolution (4) Characteristics, theories, and consequences of revolution, with particular focus on left-wing revolutions and movements. Sp

4410 Law and the Administrative Process (4) Powers of, procedures of, controls over administrators. Sp

4535-36 Political Attitudes, Opinions and Communication (4, 4) Nature, development, formation and distribution of politically relevant attitudes and opinions; role of leadership, persuasion, and communication in opinion-policy process. F, W


4545 The Judicial Process (4) The study of courts as components of political systems, and public policy formulation through judicial decision making. Recommended prereq: precalculus 210-20. Sp, W

4550 Congress (4) Nature, functions, and processes of U.S. Congress. Sp

4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs. W

4610 Budgetary Process (4) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications. W or Sp

4620 Public Personnel Administration (4) Development of the merit system in government, career service, personnel selection, personnel planning and development, organization for personnel management. F or W

4665-66 Policy Making in Democracies (4, 4)
Comparative approach to theory and process of making public policies. F, Sp.

5475 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4711 International Law (4)

4727 Politics of Inter-American Relations (4) Analysis of selected theoretical and policy issues concerning international relations in the Americas with emphasis upon imperialism, intervention, and the Cuban Revolution, nationalism, foreign assistance, trade and economic integration. Sp. & F.

4740 Political Parties and Elections (4) Analysis of party systems and electoral processes. F, W.

4750 Political Campaigns (4) All aspects of campaign process. F, W.

5000 Thesis (1-15) P/NP only. E

5003 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. E

5101 Foreign Study (1-12) See page 103. E

5102 Off-Campus Study (1-12) See page 103. E

5103 Independent Study (1-12) See page 103. E

5110-20 Seminar in Political Theory (3, 3) Selected topics for political thinkers, schools, historical periods. F, W, Sp.

5140 Politics, Administration and Community in Nonmetropolitan Areas (3) Analysis of problems and processes associated with community development. Sp.

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. S/NC only. E

5210-20 Seminar in World Politics (3, 3) Research in world problems and organization. F, W; Sp.

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. E

5250 Seminar in African Politics (3) Selected topics in African politics.

5270 Seminar in the Politics of Development (3) Selected topics dealing with political problems of less developed countries. F

5310 Seminar in Comparative Government (3) Selected topics in modern governments.

5340 Seminar in Latin American Government (3)

5370 Seminar in Soviet Politics and Government (3) W

5410-20 Seminar in Public Law (3, 3) Selected problems in constitutional and administrative law. F

5440 Theory and Analysis of U.S. Foreign Policy Processes (4) Theoretical approaches to decision making in foreign policy area and analysis of policymaking process. W

5510 Seminar in International Organization (3) Introduction to regional international organizations; political integration at international level.

5540 Seminar in Comparative Public Administration (3) Approaches to and methods used in comparative analysis.

5600 Public Administration (3) Public administration theory and functions, approaches to public management, contemporary problems in public administration. F

5605 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration: measurement, analysis, and reporting of data. W

5610 Seminar in Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector. F

5611 Seminar in State-Local Administration (3)

5645 Operations Research for Public Administrators (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 Seminar in Metropolitan Areas (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. Sp.

5710 Seminar in the Politics of Administration (3) Examination of public administration in context of American political system with emphasis upon policy making and political roles of public administrators and agencies. W

5730 Seminar: Public Budgeting (3) Technical and political aspects of planning, preparing, and adopting government budgets.

5735 Seminar: Public Financial Management (3) Management of public expenditures and management implications of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing, risk management, post-auditing.

5740 Seminar in Organizational Analysis (3) Organization theory applications in public management; field analysis of public organizations.

5750-55 Seminar in Public Management (3, 3) Selected problems. F, W

5765 Law and the Administrative Process (3) Constitutional position; decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice. W

5770 Practicum in Public Administration (3) Sp

5790 Seminar in Public Personnel Management (3) Functions and organizations of personnel administration in public service. Sp.

5795 Seminar in Staff Functions (3) Functions of administrative agents serving public executive, public bureaucratic, 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 in American politics.

5831-32 The Systematic Study of Politics (3, 3) Scope, methods and procedures of analysis in political science. F, W

5840 Ethics, Values, and Morality in Public Administration (3) Moral-ethical-value dilemmas confronting administrators in American political system.

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 Quantitative Policy Analysis (3, 3) Methods and techniques in quantitative political analysis. F, W

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6210 Advanced Studies in International Politics (3)

6310 Advanced Studies in Political Theory (4) Research into selected topics. F

6440 Advanced Studies in Comparative Politics (3) Research into selected topics. Sp.

6510-20 Advanced Studies in American Constitutional Law (3, 3) Systematic investigation of federal relationships, civil liberties, courts in political settings, judicial institutions, personnel, and public policy content.


6710 Directed Research 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.

6810-20 Advanced Studies in the Political Process (3, 3) Open to advanced graduate students upon approval of instructor. F, W.

Psychology

MAJOR

DEGREES

Psychology

M.A., Ph.D.


Associate Professors: J. M. Barlow,* Ph.D. Denver; E. A. Elliot,* M.S.W., Ph.D. Denver; M. G. Johnson, Ph.D. Johns Hopkins; J. Kandilakas, Ph.D. California; S. E. Lawler, Ph.D. North Carolina; J. W. Lounsbury, Ph.D. Michigan State; D. McNulty, Ph.D. Yale; W. G. Morgan, Ph.D. Tennessee; M. J. O'Connell,* Ph.D. Denver; R. S. Sadargad, Ph.D. Florida State; E. D. Sundstrom, Ph.D. Utah; C. B. Travis, Ph.D. California (Davis).


The Psychology Department emphasizes doctoral degree programs with specializations in clinical, school, sport psychology, developmental, experimental, cognitive, physiological, and comparative psychology, psycholinguistics, psychometrics, and learning. Some students complete a Master's degree as part of their doctoral program.

For detailed information on graduate programs and admissions requirements write: Graduate Secretary, Department of Psychology, University of Tennessee, Knoxville, Tennessee 37996-0900.

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.

3720 Ethology and Sociobiology (3) Evolutionary approach to behavior with special reference to controversial issues in applications to psychology, social sciences, and arts.

*Part-time

**Alumni Distinguished Professor.
4107 Experience in Individual Instruction (1-4) Experience as proctor in individualized instruction. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F, W, Sp only. F

4120 Topics in Social Psychology (4) Intensive analysis of selected research topics. Prereq: 3210 or Sociology 3130. (Same as Sociology 4120.)

4230 Sensory Processes and Perception (4) Survey of sensory and perceptual processes with emphasis on audition and vision. Prereq: 3150. Recommended: 2520, F.

4239 Laboratory in Sensory Processes and Perception (2) Prereq or coreq: 4230.

4460 Organizational-Industrial Psychology (3) Cannot be taken for credit by students who have credit for Management 3460. E

4510 Personality Theories (4) Prereq: 3650 or consent of instructor. F, Su

4520 Personality and Social Systems (4) Prereq: 2540.

4610 Group Processes (3) Study and experience of theory and techniques of group processing and facilitation. Those participating in 4610 are expected to continue into 4620 and 4630. Prereq: 3616-26 and consent of instructor. F

4620-30 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. W; Sp.

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: 3150; F, Su.

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.

4650 The Psychology of Language (4) Theories and descriptions of phonology, syntax, and semantics as applied to psychology and related disciplines. Recommended: 4650 or linguistics background.

4670 Cognitive Development (4) Theory and research on development of language and thinking in children and adolescents. Prereq: 3210 or 3550.

4710 Physiological Psychology (4) Nervous system and physiological correlates of behavior. Prereq: 1 yr of biology or zoology and 2520. W

4719 Physiological Psychology Laboratory (4) Laboratory studies of nervous system and physiological correlates of behavior. Coreq: 4710. W


4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Zoology 4729.) F

4750 Evolution and Ontogeny of Social Behavior (4) Genetic, evolutionary, ecological, and development processes as they apply to social organization and dynamics of vertebrates. Prereq: Consent of instructor.

4770 Psychology and the Law (4) Psychological aspects of the legal system. Prereq: Junior standing.

4830 History and Systems of Psychology (4) Prereq: 9 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 will be based on group interaction of cultural and biological factors in determining the behavior of women, with emphasis on physiological mechanisms involved. Sp.

4880 Afro-American Psychology (4) Review and analysis of psychological literature on Afro-Americans. Prereq: Consent of instructor. (Same as Black Studies 4860.)

5000 Thesis (1-15) P/NP only. E

5002 Non-thesis Graduation Completion (3-15) Required for students not registered during any quarter when such a student uses university facilities and/or faculty time before degree completion. May not be used toward graduate credit requirements. May be repeated. S/N only. E

5017 Colloquium in Ethology (1) May be repeated. Maximum 9 hrs. (Same as Zoology 5017.) S/N only.


5020 Research Practicum in Educational 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/N only.

5079 Practicum in College Teaching (2) Supervised participation in college teaching. S/N only. Sp.

5100 Developmental Psychology (3) Prereq: 3590 or Educational Psychology 2430. (Same as Educational Psychology 5100.) F, Su.

5105 Developmental Assessment (3) Techniques for assessment of 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 decision-making. Selected topics in clinical psychology, social work, and community and mental health professions. Prereq: Consent of instructor.

5111 Seminar in Current Issues in School Psychology (3) Historical, legal, ethical, and technical aspects of practice of school psychology. Multiple instruction. (Same as Educational Psychology 5111.) S/N only. F

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.) F; W; Sp.

5149-59-69 Practicum in School Psychology (1, 2, 2) First-year School Psychology Program practicum core course. Coreq: 5140-50-60. (Same as Educational Psychology 5149-56-69.) S/N only. F; W; Sp.

5170-80-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 5170-80-90.) F; W; Sp.

5200 Topics in Developmental Psychology (3) Prereq: 5100 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs. S/N only.

5300 Readings and Special Problems in Psychology (1-5) May be repeated. Maximum 20 hrs. S/N only. E

5319 Field Work in School Psychology: Level 1 (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to doctoral program in school psychology who are assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 5319.) S/N only. F, W; Sp.

5325 Behavioral Interventions (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Focuses on interventions by people in community (teachers, supervisors, etc.) Includes token economies and strategies for self-control.

5340 Group Dynamics (3) (Same as Educational Psychology 5340.)

5350-60-70 Seminar in Psychology (3, 3, 3) May be repeated. Maximum 18 hrs.

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. W; Sp; F.

5450 Human Problems in Administration (3) (Same as Management 5230.)

5490 Continuing Education in Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture; topic and format to be announced. Prereq: Graduate standing or consent of instructor. May be repeated. Maximum 9 hrs.

5500 Fundamentals in Psychometrics (4) Basic ideas and orientation in psychometrics. All graduate students who plan to take one or more courses in psychometrics required to take course. Prereq or coreq: 4640.

5510 Instrumentation for Psychological Research (3)

5520 Theory of Mental Measurement (3) Reliability, validity, scaling and equating, norms, combining tests into batteries. Prereq: 1 qtr of graduate-level statistics and 5500 or consent of instructor.

5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 5500-70 or equivalent and consent of instructor.

5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, discriminability, and item banks. Use of different populations in specific psychological parameters, individual choice behavior, and testing of pathological hypotheses. Prereq: Graduate standing or consent of instructor.

5550 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: 3120. May be used for credit in sociology.

5560 Seminar in Social Psychology (3) Prereq: 5550. May be used for credit in sociology. May be repeated. Maximum 5 hrs.

5580 Theories of Personality (3)

5581 Psychodynamic Approach to Clinical Psychology (3) Basic concepts and principles, selected topics with examples of work with patients. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5582 Behavioral Approach to Clinical Psychology (3) Human development and strategies for behavior change from viewpoint of social learning theory. Discussion of normal and deviant behaviors. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5583 Phenomenological Approach to Clinical Psychology (3) Normal development and psychological stress and psychological implications of underlying assumptions of different theories. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5589 Adult Psychological Assessment (3) Basic concepts and techniques of adult assessment, including intelligence tests and personality tests. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5591 Seminar in Object Relations Theory (3) European and American conceptions of normal and pathopsychological development of object relations, practical significance for psychotherapy and psychoanalysis. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.
5592 Descriptive Psychopathology (3) Diagnostic criteria of the DSM-III. Examples from written case histories and recorded interviews. Prereq: Admis-
sion to doctoral program in Clinical Psychology or consent of instructor.

5601 Dynamics of Psychopathology (3) Psycho-
dynamic view of causes and symptoms of major psychoses, neuroses and adjustment disorders. Pre-
req: consent of instructor. Prereq: 5595-60 and consent of instructor (Same as Educational Psychology 5595-60). W; Sp.

5595-60 Practicum in Psychological Appraisal (2, 2) Coreqs: 5580-60-70. Prereq: Consent of instructor. Must be taken in sequence. Coreq: 5858-68 and consent of instructor. (Same as Educational Psychology 5595-60). S/NC only. W; Sp.

5000 Doctoral Research and Dissertation (3-15) P/NC only. E.

5050 Seminar on Methods of Social Research (3) (Same as Sociology 6050.)

5090 Psychopharmacology (3) Review and evalu-
ation of pharmacology as it relates to psychology. Prereq: Consent of instructor. Sp. A.

5702 Community Psychology (3) Psychological aspects of research, evaluation, intervention, and planning in communities. Community ecology, sys-
tem factors for primary prevention, planning of social systems, and relevance of federal policies. Prereq: Consent of instructor.

5713 Learning Modules for Techniques in Profes-
2014ial Psychology (1-4) Set of learning packages; each learning module in anxiety, psychodynamics, child, pathology. Prereq: Consent of instruc-
tor. May be repeated. S/NC only.

5750 Ethological Psychology (3) Evolutionary and psychophysiological basis of comparative psychology and implications for human behavior. Prereq: Introducto-
tory biology and graduates standing.

5760 General Vertebrate Neuroanatomy (3) Lec-
ture and laboratory dealing with structure and func-
tion of central and peripheral nervous system. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 5760.)

5769 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory pro-
cedures central to research in physiological psycholo-
y. Prereq: 4710, 4719, and consent of instructor. May be repeated with consent of instructor.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) (Same as Speech Pathology 5790.)

5840 Student Appraisal (3) (Same as Educational Psychology 5840.)

5850 Child Psychological Assessment (3) Intro-
duction: behavioral observations, interviews, objective tests, projective techniques. Prereq: 5100 and Admission to Clinical Training Program or consent of instructor.

5859 Practicum in Psychological Appraisals (2)

5860 Interpersonal Assessment (3) Focus on objective tests such as MMPI and Leary System of interpersonal diagnosis. Prereq: 5580 or equivalent and admission to Clinical Training Program or con-
sent of instructor.

5869 Practicum in Psychological Appraisal (3) Prereq: 5100 or equivalent and admission to Clinical Training Program or consent of instructor.

5870 Projective Techniques in Assessment (3) Diagnosis of psychological disorders using case his-
tory and mental status, projective techniques. Pre-
req: 5601 or equivalent and admission to Clinical Training Program or consent of instructor.

5879 Practicum in Psychological Appraisals (3) Prereq: 5589.

5890 Counseling Theories and Techniques (3) (Same as Educational Psychology 5890.)

5900 Practicum in Psychological Appraisals (2) Prereq: 5589.

5905-60 Theory and Practice of Consultation (3, 2) Issues in consultation, models of consulting pro-
cess, and evaluation of consulting techniques. Must be taken in sequence. Coreq: 5858-68 and consent of instructor (Same as Educational Psychology 5950-60). W; Sp.

5909 Internship in School Psychology (1-6) Supervised employment at departmentally approved intern-
see school. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs. S/NC only.

6100 Seminar in Community Psychology (3) Eval-
uation, research, intervention, and systems for de-

delivery of services in communities. Prereq: 5700.

6150 Seminar in Program Evaluation (3) Techni-
ques of research and group research to evaluate effec-
tiveness of programs. Prereq: Statistics 5050-60-70 or equivalent and consent of instructor.

6159 Practicum in Program Evaluation (3) Design-
ing, conducting, analyzing results of program evaluation in school or community setting. Prereq: 6150 and consent of instructor.

6210-20-30 History, Systems, and Theories in Psychology (3, 3, 3) Prereq: M.A. in psychology or equivalent.

6250-60-70 Seminar in Industrial and Organiza-
tional Psychology (3, 3, 3) (Same as Management 6250-60-70).

6280-90 Factor Analysis (3, 3) Factor analysis; component analysis, introduction to latent structure analysis. Prereq: 4640 and 5500.

*5310 Seminar in Motivation and Emotion (3)

*5315 Field Work in School Psychology: Level II (3) Supervised on-the-job training in school psychology. Limited to students fully admitted to doctoral program in School Psychology assigned to program's field site. Prereq: 5590-60. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 6319.) S/NC only. F, W, Sp.

*5320 Seminar in Research Method (3)

*5330 Seminar in Learning (3)

*5340 Seminar in Developmental Psychology (3)

*5350 Seminar in Thinking (3)

*5360 Seminar in Sensation and Perception (3)

*5370 Seminar in Theoretical Psychology (3)

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

6385 Hypnosis and Imagiery (3) Demonstration and practice of hypnotic induction methods, survey of cli-
cial applications of hypnosis and imagery. Prereq: Consent of instructor.

*6390 Seminar in Psychotherapy (2) Treatment of current case, focusing upon psychodynamics, psychopathology, and therapeutic techniques em-
ployed. Prereq: Consent of instructor.

*6395 Seminar in Assessment (3) Seminar for advanced graduate students in clinical psychology, to deal with current techniques and methods of evaluating the status of individuals seeking clinical aid.

*6400 Seminar on Changing Concepts in Clinical Psychology (3) New developments in field in rela-
tion to their impact on experimentalistion and systems of thought. Prereq: M.A. in psychology or equivalent.

6405 Seminar in Psychopathology (3) Prereq: Consent of instructor.

6410-20-30 Psychotherapy (2, 2, 2) Theories and principles. Prereq: Consent of instructor.

6411 Seminar in Group Processes (2) Theory and practice of group therapy; communication skills. Pre-
req: Admission to Clinical Training Program or con-
sent of instructor.

6412 Seminar in Inference in Psychotherapy (2) Uses of actuarial and inferential data for assessment of strategies and tactics used in psychotherapy. Pre-
req: Admission to Clinical Training Program or consent of instructor.

6413 Seminar in Techniques of Behavior Mod-
ification (2) Practical applications of systematic de-
sensitization, operant conditioning, aversive con-
ditioning and related techniques for modification of behavior disorders. Prereq: Admission to the Clinical Psychology Program.

6414 Seminar in Marital and Family Therapy (2) Evaluating marital and family problems, methods of investigation. Psychodynamic, behavioral, and sys-
tems-theory concepts. Prereq: Admission to the Clinical Psychology Program.

6419-29-30 Psychotherapy Practicum (1, 1, 1) Coreqs: 6410-20-30: May be repeated. Maximum 12 hours.

6450-60 Advanced Psychometrics (3, 3) Construc-
tion and standardization of psychological tests.

6660 Organizational Development in Human Ser-
dies-theory concepts. Prereq: Admission to the Clinical Psychology Program.

6694 Field Experience in Clinical Psychology (1-
4) For students who have finished internship with placement in clinical psychology in local area. May be repeated. Maximum 12 hrs. S/NC only.

6695 Seminar in Psychometrics (3) Seminar for advanced graduate students in psychometrics or quantitative psychology, to deal with advanced theories, methodologies, and their applications. Prereq: 4640, 5500 or equivalent, and consent of instructor. May be repeated. Maximum 9 hrs.

6699 Practicum in Organizational Development (3) Theory and problems in organization development and manage-
ment of mental health administration.

6700 Seminar in Community Psychology (2) Theory and practice of group therapy; communication skills. Pre-
req: Admission to Clinical Training Program or consent of instructor.

6701 Seminar in Inference in Psychotherapy (2) Uses of actuarial and inferential data for assessment of strategies and tactics used in psychotherapy. Pre-
req: Admission to Clinical Training Program or consent of instructor.
Radiation Biology (Interdepartmental)

5000 Thesis (1-15) P/NP only. E
5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs. E
5620 Foundations of Radiation Biology (4) (Same as Zoology 5620.)
6000 Doctoral Research and Dissertation (3-15) P/NP only. E
6910 Seminar in Radiation Biology (2) (Same as Zoology 6910.)

Religious Studies


Assistant Professors: J. L. Fitzgerald, Ph.D. Chicago; M. Harris, Ph.D. Harvard; M. Levering, Ph.D. Harvard.

An M.A. in Philosophy with a concentration in religious studies is available for graduate work in those related fields. (Details of this program are available in the office of each 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 Fifteenth Century 3080 - Sixteenth Century to 1900. (Same as History 3060-70-80.) A
3210 Early Greek Mythology (3) (Same as Classics 3210.) F
3220 Early Greek Mythology in the Classical Period (3) (Same as Classics 3220.) W
3230 Roman Mythology (3) (Same as Classics 3230.) Sp
3270 Russian Philosophical and Theological Thought (3) (Same as Philosophy 3270 and Russian 3270.)
3411 The Renaissance (3) (Same as History 3411.)
complement to 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 coursework in the major field.

Language Requirements:

Students are expected to demonstrate written and oral fluency in Spanish as well as concentration. In addition 9 hours of courses credit only. No credit for those having had French consult page 20.

Examinations:

A comprehensive examination, both written and oral, covering the major and minor fields must be passed before a student can become an official candidate for the degree. This 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 page 20.

French

3010-20-30 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, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for those having had Elementary French. No auditors. F; W; Sp; Su

4001-02-03 Introduction to Consecutive and Simultaneous French Translation (3, 3, 3) 4001—Oral translation into English; 4002—Consecutive translation to and from French; 4003—Simultaneous translation from French to English. Training of students with intermediate or advanced knowledge of French for consecutive and simultaneous oral translation from French into English, and vice versa on variety of practical subjects such as business, economics, politics, and sciences. Given mainly in language lab with additional classroom supervision by instructor. Prereq: 3430 or equivalent. Must be taken in sequence.

4010 Masterpieces of French Literature in English Translation (3) No foreign language credit. A

4020 Masterpieces of French Drama in English Translation (3) No foreign language credit. A

4110-20-30 French Literature of the Seventeenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

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. A

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Topics range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. F; W; Sp

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. F

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2523, or equivalent. W; Sp

4250 Introduction to Descriptive Linguistics (3) Phonetics and phonemics, morphology and syntax of modern and classical languages, and dialect geography. Application of descriptive linguistics—field linguistics, 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 (excluding 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 German, Russian, and Spanish and Linguistics 4250.) F

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, Russian, Spanish and Linguistics 4260.) W

4270 Introduction to Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into the major Romance languages. (Same as Spanish and Linguistics 4570.) Sp

4310-30-30 French Literature of the Eighteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4350-60-70 Medieval French Literature (3, 3, 3) Medieval works in modern French texts. Prereq: Intermediate French or equivalent. A

4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent. A

4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

5000 Thesis (1-15) P/NP only. E

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. E

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. Intensive course in explication de texte. F

5101 Foreign Study (1-12) See page 103. E

5102 Off-campus Study (1-12) See page 103. E

5103 Independent Study (1-12) See page 103. E

5110-20-30 Old French (3, 3, 3) Medieval French language and literature. A

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. E

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as Italian and Spanish 5151-61-71.) 5/NC only. A

5210-20-30 French Literature of the Sixteenth Century (3, 3, 3) A

5211-21-31 Seventeenth Century French Literature (3, 3, 3) Detailed analysis of French poems and prose works of seventeenth century. 5211—Descartes and Pascal; 5221—Classical French theatre; 5231—French prose writers of the seventeenth century. A

5241 French Theatre of the 18th and 19th Centuries (3) Development of new dramatic forms and evolution of traditional forms in serious and comic theatre of eighteenth and nineteenth century France. A

5310-20-30 French Directed Readings (3, 3, 3) E

5350-60-70 The Philosophes (3, 3, 3) Textual analysis of the works of Voltaire, Diderot, Rousseau, and other eighteenth-century writers. A

5410-20-30 The French Novel (3, 3, 3) A

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 Frenchmen.

5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and Petits poemes en prose with emphasis on theories of consciousness and "correspondances" and French influence on Symbolist school. A

5510-20-30 Trends in Contemporary French Literature (3, 3, 3) A

5550-60 Advanced Syntax and Stylistics (3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories. A

5670 Problems in Linguistics: Romance Language (3) Topics vary. Prereq: 4250 or consent of instructor. May be repeated. Maximum 6 hrs with consent of department. (Same as Spanish 6670.) A

5710-20 Seminar in French Literature (3, 3) Topics vary. May be repeated with consent of department. Su

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as Spanish 5910.) A
Portuguese

3510-20 Aspects of Portuguese Literature (4, 4) Prereq: Intermediate Portuguese or equivalent. Recommended for literature majors. F, W

4310-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) May be repeated with consent of instructor. F, W, Sp

5101 Foreign Study (1-12) See page 103. E

5102 Off-campus Study (1-12) See page 103. E

5103 Independent Study (1-12) See page 103. E

Spanish

4050-60-70 Hispano-Arabic Literature and Culture (3, 3, 3) A

4110-20 Spanish Literature of the Golden Age (3, 3) The picaresque novel: Cervantes; the Comedia. A

4140 Theatrical Spanish (1-3) Performance in one or more of the major theaters. Prereq: Intermediate Spanish or equivalent and consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

4160-70-80 Advanced Conversation (2, 2, 2) Intensive study 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; F, W, Sp

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. F

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. W, Sp

4250 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Linguistics 4250). W

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, and Linguistics 4260). W

4270 Introduction to Romance Linguistics (3) (Same as French and Linguistics 4270). Sp

4410 Spanish Civilization (3) Prereq: Intermediate Spanish or equivalent. F

4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent. W, Sp

4510 Special Topics in Nineteenth Century Spanish Literature (3) Prereq: poetry and theatre of Spain in the nineteenth century; Genre, movement, or combination of several literary aspects; Prereq: Intermediate Spanish or equivalent. May be repeated with consent of department. Maximum 9 hrs. A

4710-20-30 Spanish Literature of the Twentieth Century (3, 3, 3) 4710—Non-dramatic prose fiction. 4720—Drama. 4730—Lyric poetry. Prereq: Intermediate Spanish or equivalent. A

4810-20-30 Topical Survey of Spanish American Literature (3, 3, 3) 4810—Prose fiction: major examples of the short story and novel. 4820—Poetry: Landmark figures of past and present. 4830—Drama and essay; the modern period. A

5000 Thesis (1-15) P/NP only. E

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. E, N/C only. E

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. F

5070-90-90 Hispano-Arabic Literature and Culture (3, 3, 3) 5070—General culture history, philosophy in Arab Spain. 5080—Development of traditional marketplace story, or episodic prose narrative, into modern novel of character after invention of printing. 5090—Mutual influence of traditional Arabic poetry and popular and native Spanish choral型号, development of classical mumushawish, the colloquial zaijal, and the later villancico. Readings in Arabic and Spanish. A

5101 Foreign Study (1-12) See page 103. E

5102 Off-campus Study (1-12) See page 103. E

5103 Independent Study (1-12) See page 103. E

5110-20-30 Old Spanish (3, 3, 3) Medieval Spanish language and literature. A

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. F

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Italian 5151-61-71) S/N/C only. A

5211-20-30 Modern Spanish Prose (3, 3, 3) A

5212-32 Goldene Age Prose (3, 3) 5212—La Celestina: critical work. 5232—Guzmán de Alfarache and Spanish picaresque genre. A

5250-60 The Generation of '98 (3, 3) Anglo Gastric, Giner de los Ríos: life and work. Céleste/sécne genre: Feliciana de Silva and Corpus Christi: 5250—Guzmán de Alfarache and Spanish picaresque genre. A

5270 The Contemporary Novel (3) Civil War and post-Civil War period. A

5310 Directed Readings (3) E

5311-21 Special Topics in Spanish or Spanish American Literature (3, 3) May be repeated. A

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. A

5550-60 The Golden Age Theatre (3, 3) 5550—Introduction to Spanish Theatre, Lope and Tirso. 5600—Clásicos de la Segunda Celestina: 5623—Guzmán de Alfarache and Spanish picaresque genre. A

5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay. A

5611-21 Spanish American Lyric Poetry (3, 3) A

5620-30 The Modern Novel in Spanish America (3, 3) A

5631 Spanish American Essay (3) A

5632 The Spanish American Short Story (3) Short story as major literary genre in Spanish America. Reading and criticism of works such as Mado, Quero, Borges, Areneola, and Ruffo. A

5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos, Sotozano, Rodolfo Usgili, Conrado Nale Roxlo, Roberto Co, Rene Marques and Sebastian Salazar Bondy. Presentation of films as adaptations of classics such as Dona Bárbara, Los de abajo and Dom Segundo Somera as well a exponents of experimental cine of today. A

5640 Latin America Women Writers (3) Feminine point of view, modern image of woman, female-relations and society as context for woman's destiny. Readings from poetry and fiction, including such authors as Alfonsina Storni, Delmira Agustini, Gabriela Mistral, Silvina Bullrich, Silvina Ocampo and Rosario Castellanos. A

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in compositions, sketches, and original stories. A

5670 Problems in Linguistics: Romance Languages (3) (Same as French 5670) A

5810-20 Spanish Lyric Poetry (3, 3, 3) A

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as French 5910) A

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6210-20-30 Seminar in Spanish Literature (3, 3, 3) Topics vary in field of Peninsular Literature. May be repeated with consent of department. A

6310-20-30 Seminar in Latin American Literature (3, 3, 3) Topics vary. May be repeated with consent of department. A

Russian

See German

Sociology

MAJOR DEGREES

Sociology

MAJOR

Professors: J. A. Black, Ph.D. Iowa; J. Champion, Ph.D. Purdue; L. Eberesol, Ph.D. Pennsylvania; D. Hastings, Ph.D. Massachusetts; N. Shover, Ph.D. Illinois; S. Wallace, Ph.D. Minnesota.

Associate Professors: D. M. Betz, Ph.D. Michigan State; D. Clelland, Ph.D. Michigan State; T. C. Hood (Acting Head), Ph.D. D. Duval, R. G. Perrin, Ph.D. British Columbia.

Assistant Professors: J. C. Fisher, Ph.D. California (San Diego); S. Kurth, Ph.D. Illinois; M. Phillips, Ph.D. Michigan; K. Ritter, Ph.D. Washington; K. Van Lane, Ph.D. Washington State.

For a full statement of departmental requirements, students are referred to the Departmental Graduate 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 concerning 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 20. 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 comprehensive 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 present a written thesis, based on comprehensive examination and a dissertation.
pass an oral examination on the doctoral dissertation. The oral examination of the candidate will be expected to show a thorough knowledge of sociological theory and methodology related to the research.

4030 Sociology and Law (4) General treatment of social origins and consequences of law and legal process. Major emphasis is placed on problems of law and social change, and on structure and functioning of legal sanctions. Some attention is paid to law and law-like phenomena in formal organizations and primitive societies.

4110 Population Problems (4) Demographic factors and social structure; trends in fertility, mortality, 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 movement, develops a critical sociological perspective on contemporary correctional programs, and provides overview of evaluative research in corrections.

4160 Theory of Attitudes and Values (4) Organization, functions and measurement of attitudes and values; approaches to attitude change, and relationship to attitudes, values and behavior.

4130 Criminology (4)

4330 Urban Ecology (4) Examination of urban, private, collective, and individual space. Classical school of ecology, its neoclassical revisers, social area analysis, and cognitive symbolic ecology emphasized.

4410 Educational Sociology (3) (Same as Curriculum and Instruction 4410.)

4530 Community Organization (4) Structure; functions; 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 re-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.) A

4560 Formal Organization (4) Analysis of bureaucratization process, division of labor, delegation of authority, channelled communication under a system of rationality.

4620 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.

4630 Social Movements (4) Development, organization, and function of social movements; attention is given to the ideology, leadership and organization of political, religious and other types of social movements. Sp

4940 Sociology of Religion (4) Interrelationship of society, culture, and religion. (Same as Religious Studies 4940.) A

5000 Thesis (1-15) P/NP only. E

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. E

5010 Professional Seminar (1) Limited to sociology graduate teaching assistants or graduate assistants. May be repeated. Maximum 4 hrs. S/NC only. W, Sp

5210 Introduction to Sociological Theory (3) F

5230 Seminar in Sociology of Medicine (3) May be repeated with different instructors. Maximum 6 hrs.

5300 Methods of Sociological Research I (3) Assumptions and foundations of sociological research strategies and techniques.

5310 Seminar in Methods of Sociological Research (3) Major methodological issues in sociology; scaling techniques; reliability, validity, sampling, and qualitative methodology.

5320-30 Social Statistics (3, 3) General survey of parametric and nonparametric procedures in analysis of sociological data; assumptions underlying procedures and possible solutions to problems. Must be taken in sequence. F; W

5350-60 Statistical Analysis in the Social Sciences I, II (3, 3) Topics include multiple regression, analysis of variance, analysis of covariance, ordinal and nominal measures of association, sampling, significance tests, and confidence limits. Extensive use of social science computing packages.

5470 Foundations of Social Psychology (3) Current and classical theoretical perspective in social psychology. May be used for credit in psychology.

5480 Foundations of Social Conflict and Change (3)

5510 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delinquency, related to them, and their implications for formal strategies of control and rehabilitation.

5520 Crime, Law, and Social Control (3)

5650 Demographic Techniques (3) Life, table, standard rates, and survey techniques of population analysis. A

5660 Seminar in Community (3)

5680 Historical Demography (3) Family reconstruction, aggregate analysis, examining documents containing information on population. Research findings on historical patterns of change in fertility, mortality, migration and different types of family structure. A

5710 Seminar in Collective Behavior and Social Movements (3) A

5720 Social Interaction (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to test selected theoretical problems. May be repeated. Maximum 6 hrs.

5740 Seminar in Social Attitudes (3)

5810 Seminar in Race and Culture (3) Critical examination of theoretical and conceptual approaches in study of intergroup relations. A

5830 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.

5840 Seminar in Occupations (3) Occupations and their relation to individual and society, technology and occupations; unequal rewards and occupations; social organization and occupations.

5850 Seminar in Occupations (3) Continuation from material in Sociology 5840; interface between occupations and settings in which they are performed.

5870 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5880 Seminar in Research Problems in Intergroup Relations (3) Research techniques and problems as encountered in race and intergroup relations are explored; actual field research projects are performed.

5890 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 (3-15) P/NP only. E

6050 Seminar on Methods of Social Research (3) Experiential research projects. (Same as Psychology 6050.)

6220 Sociological Theory I (3) Prereq: 5410 or consent of instructor.

6230 Sociological Theory II (3) Prereq: 5410 or consent of instructor.

6330-40 Survey Design and Analysis (3, 3) Application of general principles of survey research to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtrs). Prereq: 5300-10 or consent of instructor.

6350 Field Research (3) Prereq: 5300-10 or consent of instructor.

6360 Field Research Practicum (3)

6410 Tutorials in Advanced Topics (3) Individual instruction. Prereq: Consent of department. 6410 and 6420 may be repeated in any combination for a maximum of 15 hrs.

6420 Special Topics (3) Topic of special interest or student-initiated courses which will not be regularly offered. Prereq: Consent of instructor. 6410 and 6420 may be repeated in any combination for a maximum of 15 hrs.

6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding cause and procedures and programs for social control. Prereq: 4310 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; approaches to theoretical and methodological issues encountered in studying law. A

6640 Seminar in Environmental Sociology (3)

6650 Urban and Regional Sociology (3) Prereq: Consent of instructor.

6660 Human Fertility (3) Historical, topical, regional, and methodological approaches to human fertility and demographic problems. Consideration of data obtained between socioeconomic and demographic change in various parts of world, fertility rates and national power; controversies on control of vital rates of growth. Prereq: 5650 or consent of instructor.

6670 Theory and Methods of Human Ecology (3) Theoretical perspective and research techniques of human ecology applied to selected research sites. Prereq: Consent of instructor.

6680 Theory and Research in Human Migration (3) Prereq: 5650 or consent of instructor.

6700 Population Theory (3) Malthus, Marx, optimum population, and selected variables. Prereq: 5650 or consent of instructor. A

6730 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: 5470 or consent of instructor.

6740 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: 5470 or consent of instructor.

6750 Formal Organization (3) Organizations, organizational change and effect of technology; social consequences of automation; segmentation and organization; organizations and community interrelatedness. Prereq: 5740 or consent of instructor.

6780 Mass Behavior (3) Prereq: 5470 or consent of instructor.

6790 Socialization (3) Process to learn cognitive systems and forms of behavior of social world.
amination of main currents in socialization theory and research. Prereq: 5470 or consent of instructor. May be repeated with different instructors. Maximum 6 hrs.

8620 Political Sociology (3) Political system from societal, organizational, and group perspectives.

8630 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in research and current position of theory. Prereq 5480 or consent of instructor.

8640-50 Social Change (3, 3) Major theories, methods and research.

8680 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in or communities. Prereq: 5480 or consent of instructor.

Spanish
See Romance Languages

Special Programs

5010 Perspectives in the Liberal Arts (3) Seminar on role of liberal arts in education from historical and political perspectives.

5020 Inquiry in the Liberal Arts (3) Seminar on nature of evidence in social sciences, natural sciences, and humanities and fine arts to provide overview of research and issues pertinent to disciplinary focus.

5030 Learning in the Liberal Arts (3) Seminar on creative approaches to promoting liberal learning environment in classroom, incorporating use of "Great Books," critical thinking and creative problem-solving processes, values sensitivity, and other components.

Speech and Hearing Sciences
See Audiology and Speech Pathology

Speech and Theatre

MAJOR

Speech and Theatre

THEATRE

DEGREE

M.A.

M.F.A.

Professors:
P. Garvie (Head), M.A. Cambridge; R. M. Cethran; R. C. Field, M.A. Miami (Ohio); J. F. Fields (Emeritus), M.A., Ohio State; J. Harris, Ed.D. Tennessee; H. W. Harshaw, Ph.D. Pittsburgh; R. R. Mashburn, Ph.D. Florida State; P. L. Sober (Emeritus), Ph.D. Cornell; R. A. Veach, M.A. Virginia; H. W. Lester Ed.D. Tennessee.

Associate Professors:

Assistant Professors:
R. S. Ambler, Ph.D. Ohio State; L. J. DeCuir, M.F.A. Tulane; D. H. Hamptons, Ph.D. International College (Los Angeles).

The Department of Speech and Theatre offers the Master of Arts degree in Speech and Theatre with area concentrations in speech communication, theatre, and the Master of Fine Arts degree in Theatre with area concentrations in acting, directing, playwriting, and design and technical theatre.

In their prospective concentrations at the Master's level, i.e., speech or theatre, applicants must have completed undergraduate degrees approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee, Knoxville.

The Graduate Record Examination is required of all applicants. All M.F.A. applicants must submit two letters of recommendation. Auditions before appropriate faculty are required of M.F.A. applicants acting/directing applicants. Applicants for admission to M.F.A. design/technical theatre and playwriting programs must submit samples of their work.

For detailed information about the graduate program, 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 30 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) Enrollment 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 (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.

CURRICULUM FOR DEGREE

MATERIAL OF FINE ARTS DEGREE CURRICULUM

At least 60 quarter hours, 40 of which must be at the 5000 level or above, are required for the Master of Fine Arts degree in Theatre. The number of hours each student will carry per quarter will vary with the student's concentration. The distribution of courses within the department may necessitate some students' accumulating more than 60 hours in order to earn the degree, but no student should require more than two years to finish the program. Ten to 12 hours of theatre history during the first year of residence are mandatory for all students unless appropriate undergraduate course work is evidenced. Theatre 5011-12-13 is required of all except acting students. Students will be admitted to the directing concentration only by petition after the first year of the acting/directing program is completed.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a Master's or a doctoral degree may apply up to 15 credit hours from the previous graduate program to the MFA degree, with approval of the student's committee, the Dean of the College of Liberal Arts, the Dean for Graduate Studies and/or the Vice Chancellor for Graduate Studies and Research.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum, and must have been earned within the time limits (6 years) established for completion of the MFA degree.

Speech

4222 Advanced Argumentation and Debate (4) Prereq: 2251, or consent of instructor. Sp.

4461 Quantitative Research Methods in Speech Communication (4) Designing experiments; planning field studies; using statistical analyses.

4541 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211.

4550 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. F.

4571 British Oratory (4) Historical and critical study of British public address. Sp. A

4591 Persuasive Uses of Imaginative Literature (4) Topics in social and political uses of novels, plays, and poems. W

4811 Advanced Phonetics (4) Phonetic aspects of contemporary dialects and English language. Prereq: Consent of instructor. Sp. A

4930 Studies in American Public Address (4) May be repeated. Maximum 12 hrs.

4999 Colloquium in Speech Communication (1) May be repeated. E

5140 Communications Theory (3) Analysis of contemporary theories of human communication, emphasizing similarities and differences of communication processes in interpersonal, interperson, and mass communications systems. F

5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs. Sp.

5220 Quantitative Projects in Speech Communications (3) May be repeated. Maximum 9 hrs. E

5440 Organizational Communication (3) May be repeated. Maximum 9 hrs. F

5550-60-70 Studies in Persuasion (3, 3, 3) W

5750-60-70 Studies in Rhetoric (3, 3, 3) F

5911 Directing the Forensic Program (4) Philoso- phy and methods of directing curricular and extracurricular forensic activities in high schools and colleges: competitive and noncompetitive approaches to directing debate, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911) Sp.

Speech and Theatre

4640 Group Performances of Literature (4) Oral interpretive techniques of choral reading, readers theatre and chamber theatre. F, W

5000 Thesis (3-15) P/NP only. E

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 be used toward degree requirements. May be repeated. S-NC only. E

5110 Introduction to Graduate Research in Speech and Theatre (3) F

5120 Directed Research and Research (3) May be repeated. Maximum 9 hrs. E

5160 Theory and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to oral interpretation.

Theatre

3214-15 Technical Theatre (4, 4) Special techniques in scene, property construction, stage management; problems in basic technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

3221-22 Introduction to Scene Design (4, 4) 3221—Problems in stage design with reference to space, setting, movement, scale, and style; rudiments of rendering and groundplan preparation. 3222—Play interpretation through scenic means; setting as environment for dramatic action, rudiments of model-making. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

3252-53-54 History of the Theatre (4, 4, 4) Drama in performance with particular emphasis on theatre architecture, scene design, and acting styles. 3252—Antiquity to the Renaissance. 3253—The European Theatre, 1650-1850. 3254—Modern Theatre. Graduate credit available to Theatre MFA students only.

3262-63 History of American Theatre (4, 4) Development of theatre as social institution in American life. 3262—from its beginnings to 1900. 3263—from 1900 to present. Graduate credit available to Theatre MFA students only.

3321-22 Introduction to Lighting Design (4, 4) Mechanics of stage lighting; elementary theory; problems in basic lighting practice. Prereq: 2211-21 and consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

3511-12 Introduction to Costume Design (4, 4) Costume as an expression of character on stage; the application of costume history to specific design projects. Prereq: 2231 or consent of instructor. Graduate credit available to Theatre MFA students only.

4133-34 Special Problems in Acting (3, 3) Advanced exercises in voice and movement; preparation of major role under performance conditions. Prereq: 3121-22 and consent of instructor. F, W

4214-15 Advanced Technical Theatre (4, 4) Advanced technical theatre management; advanced scenery and property execution; special problems in stage management; properties in basic technical theatre practice. Prereq: 2211-21 or consent of instructor. Must be taken in sequence. W, Sp

4241-42 Advanced Scene Design (4, 4) 4241—Descriptive drawing as an approach to three-dimensional design; theatrical graphic standards and preparation of drawing design. 4242—Perception of surface color; construction of spatial illusion through color with reference to rendering, scene painting, and the manipulation of painter's elevations. Must be taken in sequence. Prereq: 2211-21, 3221-22 and consent of instructor. W, Sp

4341-42 Advanced Lighting Design (4, 4) Relationship of light to setting in creating stage environment. Prereq: 3351-52 and consent of instructor. Must be taken in sequence. F, W

4441-42 Advanced Play Directing (4, 4) Problems of play interpretation; directing period plays; preparation of plays for public performance. Prereq: 3451-52 and consent of instructor. Must be taken in sequence. F, W

4541-42 Advanced Theatre Costume Design (4, 4) Advanced problems in costume design and construction; pattern drafting; draping. Prereq: 3511 or 3512. W, Sp

4751-52 Dramatic Theory and Criticism (3, 3) W, Sp

4951-52 Playwriting (4, 4) Prereq: Consent of instructor. F, W

5011-12-13 Projects in Lieu of Thesis (3, 3, 3) Available to Theatre M.F.A. students only. Maximum 9 hrs.

5214 Special Problems in Technical Theatre (4) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

5241 Studies in Scene Design (4) Advanced scene design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 8 hrs.

5250 Seminar in Playwriting (3) Sp

5310 Studies in European Theatre History (3) Prereq: 3121-22 and consent of instructor. Must be taken in sequence. Maximum 9 hrs. F, W

5320 Studies in American Theatre History (3) Prereq: 3121-22 and consent of instructor. May be repeated. Maximum 8 hrs. W

5341 Studies in Lighting Design (4) scene design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 8 hrs.

5551 Costume Design and Production (4) Practical application and production of costume designs for the stage. Prereq: 2231, 3511, 3512, 4541, 4542 and/or consent of instructor. May be repeated. Maximum 8 hrs.

5620 Projects in Lighting Design (3) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

5630 Projects in Play Directing (3) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

5640 Projects in Scene Design (3) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

5650 Projects in Costume Design (3) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

5660 Projects in Technical Theatre (3) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

5670-71-72-73-74-75 Master Class in Acting (5, 5, 5, 5) Available to Theatre M.F.A. students only.

5680-81-82 Design and Technical Theatre Seminar (1-6, 1-6, 1-6) Available to Theatre M.F.A. students only. Maximum 9 hrs. E

5690 Studies in Theatrical Production (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Sp

5912 Play Production in Secondary Schools (4) Principles and methods for directing high school dramatic programs. (Same as Curriculum and Instruction 5912.) Su

5950-69-70 Studies in Dramatic Theory and Criticism (3, 3, 3) F, W, Sp

Speech Pathology

See Audiology and Speech Pathology.

Zoology

MAJOR DEGREES

Zoology M.S., Ph.D.


Associate Professors: K. D. Burnham, Ph.D. Iowa; A. C. Echternacht, Ph.D. Kansas; D. J. Fox, Ph.D. Johns Hopkins; M. A. Handler, Ph.D. Kansas State; J. A. MacCabe, Ph.D. California (Davis); M. L. Pan, Ph.D. Pennsylvania; S. L. Pihl, Ph.D. New Mexico State; S. E. Reichert, Ph.D. Wisconsin; L. A. Vaughan, Ph.D. Duke; M. C. Whiteside, Ph.D. Indiana.

Assistant Professors: T. T. Chen, Ph.D. Florida; L. D. Etkin, Ph.D. Indiana; N. Greenberg, Ph.D. Rutgers; G. F. McCracken, Ph.D. Cornell.

The Department of Zoology offers the Master of Science and Doctor of Philosophy degrees with concentrations in aquatic biology, ecology, cell biology and molecular biology, physiological ecology, and reproductive and developmental biology. Requirements for admission: Applicants for graduate study are expected to have a background no less extensive than that required of undergraduates. In this department this includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are: (1) general zoology or general biology, 12 quarter hours; (2) upper division zoology, 18 quarter hours; (3) chemistry, two years including 12 quarter hours of general inorganic; (4) mathematics, 9 quarter hours including differential and integral calculus; (5) physics, 12 quarter hours; (6) Graduate Record Examination scores (Verbal, Quantitative and Advanced Biology); and (7) a grade point average of 3.0 or higher.

Students must be proficient 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 six areas of zoology as determined by a qualifying examination. Students are required to 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 two years after admission of 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 membership 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 comprehensive examination will be in 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 the third quarter of a language course. This requirement for the first language must be fulfilled before the student can take the comprehensive 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 language examination in the second language.

3050 Comparative Vertebrate Embryology (5) Developmental morphology of selected vertebrates. 2 hrs and 3 labs. F, Sp

3060 Comparative Vertebrate Anatomy (5) Physiology and anatomy of organ systems. Dogs, fish, and cat primarily used in laboratory. 3 hrs and 2 labs. W


3110 General Entomology (5) Introduction to insects: basic structure, development, behavior; classification of insects and representative families; interpretation and use of keys. Prereq: Biology 3130 or consent of instructor. 3 hrs and 2 labs. F

3150 Invertebrate Zoology (5) Biology of invertebrates (except insects) with emphasis on ecology and behavior. Prereq: Biology 3130. 3 hrs and 2 labs. W

3220 Physiology of Reproduction (3) (Same as Animal Science 3220.) F, Sp

3230 Histology (4) Study of animal tissues. Prereq: Biology 3120. 2 hrs and 2 labs. F, Sp

3410 Bioethics (3) Relationship between biological discoveries and social responsibility. Open discussion of selected dilemmas arising from new knowledge about medicine, behavior, resources, and technology. Sp

4007-417 Minicourse in Zoology (2 hrs each) Selected, advanced topics in zoology, concentrated in time and subject matter. Consult departmental listing for actual topics offered. Prereq: As posted. May be repeated. E

4050 Developmental Biology (4) Experimental morphogenesis, fertilization, cellular interactions, hormonal effects and related topics with examples drawn from insects and vertebrates. Prereq: 3090. 2 hrs and 2 labs. W

4120 Undergraduate Research Participation (2) Experience in active research projects under supervision of staff members. Prereq: Consent of instructor. E

4140 Practicum in Zoology (1-3) Participation in practical application of zoology in community institutions, government organizations and industry. Approximate 5 hrs involvement per week. Prereq: Biology 3110, 3120, 3130 and senior standing. E

4190 Mammalogy (4) Classification, evolution, distribution, reproduction, populations, and behavior. 2 hrs and 2 labs or field periods. F

4200 Ichthyology (5) Classification, collection and preservation, reproduction, populations, and behavior. 2 hrs and 2 labs or field periods. F

4250 Comparative Animal Physiology Laboratory (1) Prereq: Coreq: 4250. W

4250 Comparative Animal Physiology Laboratory (1) (3) Special problems and methods. Prereq: Coreq: 4250. Sp

4270 Immunology (3) (Same as Microbiology 4270.)

4280 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates and invertebrates. Their role and interaction in maintenance of the organism and species. Prereq: 3080 or equivalent. W

4290 Herpetology (4) Classification, distribution, life histories, collection and identification of amphibians and reptiles, primarily of local species. 2 hrs and 2 labs or field periods. Sp

4300 Ornithology (4) Morphology, physiology, behavior, population, populations, evolution, field identification. 2 hrs and 2 labs or field periods.

4320 Microtechnique (4) Prereq: 3320 recommended. 2 hrs and 2 labs.

4330 General Cytology (4) Study of cellular organelles at the light and electron microscope levels and the functioning of these organelles. Prereq: Biology 3120. Sp

4369 General Genetic Laboratory (2) Mainly Drosophila experiments designed to illustrate basic principles of inheritance. Prereq: Biology 3130. W

4380 Organic Evolution (3) Two-week laboratory course with emphasis on principles and problems of organic evolution. Prereq: Biology 3120. Sp

4390 Human Genetics (3) Principles and problems of inheritance in humans. 3 hrs and 1 lab. F

4410 General Parasitology (4) Morphology, taxonomy and ecology of parasitic worms and protozoa, with emphasis on host-parasite relationships. Prereq: Biology 3130 or consent of instructor. 3 hrs and 1 lab. F

4650 Introduction to Aquatic Ecology (4) Physicochemical nature of inland waters. Biologic communities are described, interrelationships explored. Prereq: Chemistry 1110-20-30. Biology 3130. 2 hrs and 2 labs. F

4700 Arachnology (4) Biology of spiders, mites, scorpions, and relatives. Prereq: 3110, or 3150. 2 hrs and 2 labs. W

4720 Comparative Animal Behavior (4) Methods and principles. (Same as Psychology 4720.) F

4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Psychology 4729.) F

4810-20-30 Insect Morphology and Taxonomy (4, 4, 4) Insects as representatives of the generalized and specialized forms. 4810—Taxonomy of major orders. 4830—Taxonomy of minor orders and immature forms. Prereq for 4820-30: 3110 or consent of instructor. 2 hrs and 2 labs. W, F; Sp; A

4940 Physiology of Exercise (4) Functions of body in muscular work; physiological aspects of fatigue, training, and physical fitness. Prereq: 2920-30 or 3080. 3 hrs and 1 lab. F, Sp

5000 Theory and Practice of Physiology (1-15) P/NP only. E

5017 Colloquium in Ethology (1) (Same as Psychology 5017). S/N/C only.

5050 Zoology Seminar (1) Advanced topics or controversial issues in zoology. May be repeated. Maximum 6 hrs. All senior Zoology majors encouraged. Required of all first and second-year graduate students. S/N/C only. F, W, Sp

5075 Zoopelagik Ecology (4) Secondary productivity in aquatic systems. Prereq: 4600 or equivalent. Su

5080 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director whose research projects coincide with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. S/N/C only. E

5110-20-30 Special Problems (2, 2, 2) E

5150 Zoological Biology (1) Methods of locating and using zoological literature, bibliographies, and abstracts, as well as preparation bibliographies and scientific papers.

5160 Fresh Water Invertebrate Zoology (4) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Laboratory and field study. Prereq: 3130 or consent of instructor. Sp


5270 Advanced Neuro muscular Physiology (5) Cellular and molecular aspects of phenomena involved in actions of different kinds of radiations on living cells and tissues. 4810. 1 yr general chemistry or consent of instructor. 2 hrs and 2 labs. W, A

5290 Quaternary Problems (4) (Same as Geology 5290 and Botany 5290.)

5350 Biometry (3) Statistical methods used in analysis of quantitative biological data. Prereq: 1 yr statistics or consent of instructor. F

5380 Isotopic Methods and Techniques: Lecture (2) Theory of isotopic decay, measurement of isotopic decay by liquid scintillation counting, single and double isotope counting, applications using Cerenkov radiation, radioimmunossay, synthesis of metabolic intermediates, experimental design and data analysis. Coreq: 5389. Prereq: Upper division laboratory course in either biochemistry, microbiology, or physics consent of instructor. F

5389 Isotopic Methods and Techniques: Laboratory (4) Use of liquid scintillation counter, optimization of counting parameters for single and double isotope counting, quenching and correction, measurement of Cerenkov radiation, procedures for measuring blood volume, solute uptake into cells, radioimmunossay of steroid hormones, hormone synthesis, synthesis of metabolic intermediates and other topics. Coreq: 5360. Prereq: Graduate standing and one upper division laboratory course in either biochemistry, microbiology or physics consent of instructor. Chemistry 3810 highly recommended. F

5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.

5510-20 Advanced Animal Physiology (5, 5) Primarily mammalian physiology; 5510—membrane neuron, central nervous system, cardiovascular system, and control mechanisms; 5520—respiratory, renal, gastrointestinal, and reproductive physiology, acid-base mechanisms, and metabolism. Should be taken in sequence if both courses are taken. Prereq: General undergraduate anatomy and physiology and Biochemistry 4110 or equivalent of consent of instructor. Biochemistry 4120 also recommended. (Same as Animal Science 5510-20.) 4 hrs and 1 lab. W, Sp

5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5600 Foundations of Radiation Biology (4) Physical, chemical, and biological mechanisms involved in actions of different kinds of radiations on living cells and its components. Recommended prereq: 1 yr biological science, general physics; biochemistry; calculus. (Same as Radiation Biology 5660.) 3 hrs and 1 lab. F

5660 Physiology of Development (3) Chemical aspects of growth and differentiation, and cytodifferentiation. Recommended prerequisite: Biochemistry 4110-20. F
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Coreqs</th>
</tr>
</thead>
<tbody>
<tr>
<td>5740</td>
<td>Physiological Ecology of Animals (2)</td>
<td>Adaptive physiological responses of animals to natural changes in or extremes of physical and biotic environment. Emphasis on terrestrial vertebrates. Term paper including review of assigned topic with emphasis on creative development of special aspect. 1.2-hr lab. Su</td>
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<tr>
<td>5750</td>
<td>Physiological Ethology (3)</td>
<td>Behavioral endocrinology and neurology from ethological perspective; reciprocal relationships of physiology and behavior in natural context. Prereq: Consent of instructor, or Psychology/Zoology 4720, or undergraduate course in physiology. W</td>
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<tr>
<td>5760</td>
<td>General Vertebrate Neuroanatomy (3)</td>
<td>(Same as Psychology 5760.)</td>
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<tr>
<td>5780</td>
<td>Transport of Ions Across Epithelia (4)</td>
<td>Operational principles and methods needed to study electrical and kinetic properties of epithelia and electrically excitable tissues. Quantitative methods of measuring ion fluxes and flux ratios. Prereq: Two upper-division physiology courses, graduate standing, or consent of instructor. Recommended prereq. Chemistry 3810.</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>5820</td>
<td>Methods of Taxonomy (4)</td>
<td>Classification of animals; rules of nomenclature; problems in priority: preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>5840</td>
<td>Aquatic Insects (4)</td>
<td>Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>5860</td>
<td>Geographic Distribution of Animals (4)</td>
<td>Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6000</td>
<td>Doctoral Research and Dissertation (3-15)</td>
<td>P/NP only. E</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6100</td>
<td>Advanced Topics in Cell and Molecular Biology (1-3)</td>
<td>Readings and discussions of recent advances in cell biology. Prereq: Biology 3120 and consent of instructor. May be repeated with consent of department. Maximum 12 hrs.</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6210</td>
<td>Seminar in Physiology (2)</td>
<td>Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6310</td>
<td>Seminar in Cytology (2)</td>
<td>May be repeated. Maximum 6 hrs.</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6550</td>
<td>Seminar in Developmental Biology (2)</td>
<td>Internal regulation in differentiating cell. Prereq: 3050, 4050; Biochemistry 4110-20. W</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6510</td>
<td>Seminar in Genetics (2)</td>
<td>Prereq: General genetics. May be repeated. Maximum 6 hrs. F</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6610</td>
<td>Seminar in Ornithology (2)</td>
<td>Prereq: 4300. May be repeated. Maximum 6 hrs.</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6650</td>
<td>Seminar in Aquatic Biology (2)</td>
<td>Prereq: Any 2 of 4200, 4660; Botany 5061; or consent of instructor. May be repeated. Maximum 6 hrs. F, W, Sp</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6710</td>
<td>Seminar in Ecology (2)</td>
<td>Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6810</td>
<td>Seminar in Entomology (2)</td>
<td>Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp</td>
<td>Prereq: Consent of instructor. W</td>
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<tr>
<td>6910</td>
<td>Seminar in Radiation Biology (2)</td>
<td>Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)</td>
<td>Prereq: Consent of instructor. W</td>
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</table>
Robert L. Summitt, Dean

The major campus of the College of Medicine is located in Memphis, Tennessee. The College, however, is a statewide organization with other units in Chattanooga, Jackson, and Knoxville.

In addition to Department of Medical Biology faculty listed here, the Knoxville campus has other College of Medicine faculty and students in undergraduate and graduate medical education.

The College of Medicine traces its origin to the establishment of the Medical Department of the University of Nashville in 1851. Later, through a merger of four medical schools, it became The University of Tennessee College of Medicine and moved to Memphis in 1911.

Department of Medical Biology/Memorial Research Center

Professors:
- W. R. Farkas (Acting Chairman), Ph.D. Duke; J. E. Fuhr (Director), Ph.D. St. John’s; C. C. Congdon (Emeritus), M.D. Michigan; J. B. Jones, D.V.M. Illinois; R. D. Large, M.D. Washington (St. Louis); C. B. Lozzio, M.D. Buenos Aires (Argentina); T. P. McDonald, Ph.D. Tennessee; E. A. Machado, M.D. Buenos Aires (Argentina); J. C. Parker, M.D. Medical College (Virginia); P. W. Wigler, Ph.D. California (Berkeley); C. J. Wust, Ph.D. Indiana (Bloomington).

Associate Professors:
- J. P. Chen, Ph.D. Pennsylvania State; P. B. Coulson, Ph.D. Illinois; E. W. Fusion, Ph.D. Tennessee; W. T. Hanna, M.D. Ain-Shams (Egypt); A. T. Ichiki, Ph.D. California (Los Angeles); K. D. Lin, M.D. National Taiwan; E. C. Schroeder, D.V.M. Michigan State.

Assistant Professors:

The Department of Medical Biology of The University of Tennessee College of Medicine-Knoxville was formed from the faculty of The University of Tennessee Memorial Research Center and Hospital in 1978. The Research Center was established in 1956. Its faculty has education, research, and service interests in cancer, blood diseases, birth defects and clinical genetics, and biochemistry of disease. Courses in these areas are offered to students at the graduate and undergraduate levels. Elective courses are also available to students in the College of Medicine by special arrangement.

The faculty with the College of Veterinary Medicine participates in the graduate program leading to M.S. and Ph.D. degrees in Comparative and Experimental Medicine. Other advanced degree students can do thesis research in the department by arrangement with other life science departments at the University.

Courses

4210 Introduction to the Study of Cancer (3) Lectures, classroom discussion, and case reports surveying the major topics of oncology. Prereq: Biology 3110-20 or consent of instructor. Sp

4310 Introduction to Hematology (4) Pathophysiology of blood and blood forming systems. Lectures, class discussions and demonstrations. Prereq: Upper division biology background to include histology and/or general anatomy. F

4430 Clinical Genetics (3) Human genetic disorders, case presentations. Prereq: General biology and general genetics background or consent of instructor. Sp

5000 Thesis (1-15) P/NP only. E

5080 Graduate Research Participation (3) Advanced research techniques studied while conducting individual biomedical research projects under the supervision of faculty. Prereq: Consent of instructor. Open to all graduate students. May be repeated with consent. Maximum 9 hrs. S/NC only. E

5220 Special Topics in Cancer (1-3) Special topics in oncology. Prereq: 4210 and consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp

5320 Special Topics in Hematology (1-3) Special topics in clinical hematology. Prereq: 4310 and consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp


5410 Molecular Basis for Metabolic Disease (5) Metabolic disorders of humans and animals. Emphasis on molecular mechanisms in inborn errors of metabolism, toxic reactions, and deficiency states.

Clinical and pathologic correlations. Prereq: Biochemistry 4110-20 or equivalent. W, A

5420 Special Topics in Metabolic Disease (1-3) Biochemical and physiological basis of selected diseases of humans and animals. Clinical-pathological correlations. Prereq: 5410 and consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp

5430 Metabolism of Drugs (2) Drug mechanisms of action: membrane transport, enzyme reactions, drug receptors, ionization, stereospecificity and metabolic pathways. For students interested in biochemical pharmacology. Prereq: Biochemistry 4110-20. Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110 Advanced Topics in Medical Biology (2) New developments in biologic research applicable to clinical medicine. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F, W, Sp

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 or educators 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 FOR ADMISSION

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 successfully complete of the equivalent of an upper division major in Nursing as part of the M.S.N. program.
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;
   e. who are currently employed as nurse educators in programs preparing registered nurses; or
4. who are currently employed as directors of nursing service.
5. 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: 23 hrs
   - Clinical concentration option: 20 hrs
   - Role preparation option: 11 hrs
   - Electives: 6 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 6 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 care nursing, secondary/tertiary care nursing, parent-child nursing or community mental health nursing as their clinical concentration option. Students selecting the primary care nursing option must complete 5450, 5460, 5550. Students selecting the secondary/tertiary care nursing option must complete 5120-30 and 5310. Students selecting the parent-child nursing option must complete 5220, 5225, and either 5230 or 5245. Students selecting the community health nursing option must complete 5410, 5480, 5490, 5500 and 5510.
6. The core requirement that must be approved in advance by the student's faculty advisor.
7. Students may select a role preparation option in teaching or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5650. Students selecting the advanced clinical practice option must complete 5560 and 5560 if their clinical option is primary care, 5320 and 5340 if their clinical option is secondary care, 5520 and 5540 if their clinical option is community mental health, or 5265 and 5270 if their clinical option is parent-child nursing. Except for electives, all courses taken in other colleges must be approved in advance by the student's faculty advisor.
8. Students whose baccalaureate degrees are not in nursing must complete the equivalent of a baccalaureate nursing major by taking or challenging a series of undergraduate nursing courses as determined by each student's major advisor.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

1. Students must complete 60 hours at the graduate level (with a cumulative GPA of 3.0) unless they already have Master's or doctoral degrees. For the latter up to 15 hours may be applied to the second Master's degree, with approval of the student's committee, Dean of the College, Dean for Graduate Studies and/or Vice Chancellor for Graduate Studies and Research.

Any hours so applied would be from courses in the first degree program that are directly relevant to the second. Hours from the first program to be applied to the second shall have been earned within the time limits (six years) established for the second.

Reduction of hour requirements, when appropriate, will not be used to reduce the residency requirements of the second Master's degree.
2. The 45 to 60 hours must include the following components:
5130 Secondary/Tertiary Nursing of Adults II (6) Continuation of 5120 with further exploration of role of cancer, including advanced oncology theoretical and conceptual knowledge and concepts to nursing care of hospitalized adults with emphasis on analysis and utilization of nursing and health related research findings. Prereq: 5010, 5030, 5070 or consent of instructor. Coreq: 5680. 3 hrs and 3 labs. W

5170 Readings in Applied Physiology (3) Carefully planned library study of selected topics in physiology and pathophysiology related to various body systems. Prereq: 5010, 5030, 5070. W

5210 Applied Nursing Research (4) Utilization of research process to identify and investigate common nursing problems; critical assessment of nursing research methods and critique of nursing research proposals. Prereq: 4440 or equivalent. Grade level statistics course. W, Sp

5220 Parent-Child Nursing (6) Care of childbearing and child-rearing families: health promotion and recognition of threats to health of mothers and children; childbearing or child-rearing families in acute care or community settings. Prereq: 5010, 5030, 5070. 4 hrs and 2 labs. W


5245 Pediatric Nursing (6) Continuation of 5220. Roles of the clinical specialist in working with children and families experiencing acute, chronic, or terminal illnesses. Nursing, physiological, developmental and psychological theories in acute pediatric facilities. Prereq: 5220. 4 hrs 2 labs. W

5255 Parent-Child Nursing Field Work I (8) Advanced clinical practice with mothers or children in any setting; complex clinical situations. Prereq: 5010, 5030, 5070. 5 hrs and 3 labs. Coreq: 5680. Sp

5265 Parent-Child Nursing Field Work II (9) Continuation of 5255. Prereq: Coreq: 5270. F

5270 Parent-Child Nursing Seminar (2) Issues and problems in delivering high quality parent-child nursing care; theories and concepts from 5680 as they affect role of parent-child clinical specialist. Prereq: 5680 Coreq: 5255. F

5310 Secondary/Tertiary Care Field Work I (8) Advanced clinical practice in acute care settings with opportunities to apply newly acquired nursing knowledge to more complex clinical nursing situations. Prereq: 5120-30. Sp

5320 Secondary/Tertiary Nursing Field Work II (9) Continuation of 5310. 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: 5480. Coreq: 5520. F

5480 Community Mental Health Nursing: Individual (3) Application of nursing process within system of care, to an individual or family, to individuals experiencing mental health problems; study of psychopharmacological issues; analysis of specific community problems. Prereq: 5010, 5030, 5070. 2 hrs and 1 lab. W

5490 Community Mental Health Nursing: Family (3) Application of nursing process, utilizing communication and systematic clinical approaches to work with families experiencing mental health problems; current models of family education. Prereq: 5020, 5480. Prereq or coreq: 5210. 2 hrs and 1 lab. Sp

5500 Community Mental Health Nursing: Group (3) Study of group leadership and group dynamics; utilization of leadership strategies in both structured and unstructured group processes. Prereq: 5480. 2 hrs and 1 lab. Sp

5510 Community Mental Health Nursing Field Work I (8) Clinical practicum in a community setting providing opportunities to apply mental health nursing knowledge in planned interactions with individuals and groups at primary, secondary and/or tertiary care levels. Community and mental health systems assessment. Su

5520 Community Mental Health Nursing Field Work II (9) Clinical practicum in a community setting, choosing functional concentration of advanced clinical practice. Objectives identified by student to meet specified educational and professional needs. Prereq: 5510. F

5540 Community Mental Health Nursing Seminar (2) Identification of issues and problems involved in delivery of community mental health nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect the role of nurse as community mental health specialist. Prereq: 5680, Coreq: 5520. F

5550 Primary Care Nursing Field Work I (8) Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function more autonomously. Prereq: 5550. F

5560 Primary Care Nursing Field Work II (9) Continuation of 5550 with further emphasis on acquisition and refinement of nursing skills needed to provide high quality nursing care to acute ill patients. Prereq: 5330. F

5590 Coreq: 5680. Sp

5670 Principles of Community Mental Health (3) Exploration of historical and legislative mandates of the community mental health movement; study of group leadership and group dynamic theories; utilization of leadership strategies in therapeutic work with individuals experiencing mental health problems; study of psychopharmacological issues; analysis of specific community problems. Prereq: 5010, 5030, 5070. 2 hrs and 1 lab. W

5590 Primary Care Nursing Seminar (2) Issues and problems involved in delivery of primary nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect role of nurse as primary care provider. Prereq: 5680. Coreq: 5550. F

5680 Advanced Nursing Seminar (3) Theories of leadership, motivation, power, conflict, authority, change and decision making and their application to advanced clinical nursing practice; examination and analysis of role of nurse as health care provider and client—family advocate. Prereq or coreq: 5310 or 5550 or 5510. Su

5730 Management Strategies and Practice (5) Analysis and application of curricular and teaching methodologies, field placement with supervised opportunities to provide both classroom and clinical instruction to undergraduate nursing students. Prereq: 8 hrs of advanced education in health sciences or consent of instructor. 2 hrs and 3 labs. F

5760 Family Nursing Seminar (2) Issues and problems involved in delivery of primary nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect role of nurse as primary care provider. Prereq: 5680. Coreq: 5550. F

5770 Special Topics (3) In-depth study of selected nursing topics, problems, or issues not covered in courses. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

5900 Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nutrition and Food Science 5910, Physical Education 5900, and Social Work 5900. 2-9 hrs. P/NP only. E

Prereq: 4230, R.N. status, or consent of instructor. May be repeated. 5-N/C only. E

5070 Theories of Nursing (3) History of nursing theory; examination of selected nursing concepts, theories, conceptual frameworks and philosophies and their relationship to nursing education and nursing practices. F

5080 Family Centered Primary Care Nursing I (6) Primary care nursing and health care management of individuals and families in child bearing and child rearing stages of development; application of nursing process with emphasis on selected nursing, physiological, and psychosocial theories. Prereq: 5010, 5030, 5070. 4 hrs and 2 labs. W

5090 Coreq: 5680. Sp

5100 Independent Study in Nursing (1-4) In-depth exploration of nursing topic of special interest to student. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5120 Secondary/Tertiary Nursing of Adults I (6) Role of clinical nurse specialist in assisting adults and their families encounter health; application of advanced nursing, physiological, developmental and psychosocial theories to delivery of health and nursing care to adults and their families who are experiencing acute illness episodes and related crises. Prereq: 5010, 5030, 5070. 3 hrs and 3 labs. W

Electives 2-9 hrs

Total 45-60 hrs
School of Architecture

Roy F. Knight, Dean
William J. Lauer, Associate Dean

Professors:

Assistant Professors:
W. E. Martella, B.Arch. California (Berkeley); M. S. Moffett, Ph.D. Massachusetts Institute of Technology; V. Narancic, B.Arch. Belgrade.

Associate Professors:

4101 Community Form (3) Patterns of community development. Selected historical and contemporary examples. Basic urban design issues and exemplary design approaches through lectures, readings, essays, and sketch studies. F

4430 Architecture and Preservation (6) Rehabilitation, restoration, and adaptive uses of existing buildings.


4811 Special Topics in History, Theory and Criticism (1-4) Special topics in history-related subjects. May be repeated. Maximum 6 hrs.

4815 Criticism Seminar (3) Theories, function, and techniques of architectural criticism. Sp

4830 Introduction to Preservation (3) History and theory of architectural preservation and restoration. F

4831 Preservation Technology (3) Techniques of preservation: dating, methods of analysis, history of materials and technology used in old buildings. W

4832 Descriptive Analysis of Historic Buildings (3) Identification and analysis of characteristic elements of buildings from various architectural periods with emphasis on American architecture. Survey techniques. Sp

4833 Preservation law (3) Legal aspects of contemporary preservation activity.

4850 Elementary Structural Matrix Methods (4) Introduction to generalized matrix methods of analysis of structures. Review of matrix algebra and vectors; development of member stiffness and flexibility matrices; assembly of structure stiffness and flexibility matrices. Prereq: Consent of instructor. (Same as Civil Engineering 4850 and Engineering Science and Mechanics 4850.) Su

4870 Architectural Photography (3) as a design, research and presentation medium. Emphasis on architectural photography using black and white media. F, W, Sp

4871 Advanced Architectural Photography (3) Application of special photographic techniques with emphasis on color printing and processing. Prereq: Consent of instructor. F, W, Sp

4887 Structural Design for Protection Against Extreme Hazards (3) 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. F


4940 Proxemics (4) Seminar for graduate students and upper division students. Introduction to proxemic research. Definition of proxemic variables. Proxemic function exercises. Analysis of etic data and the identification of emic categories. Observer bias and methods of bias reduction. Members of seminar required to design, conduct, and present original proxemic research. Prereq: 2000 or consent of instructor.

4950 Environment as Code (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 instruction. (Same behavior in animals and humans. Relationship between coding behavior and the organization of the central nervous system. Coding and social behavior. Communication process as a generic model of human environment relations. Hierarchical aspects of environmental communications. Prereq: 2000 or consent of instructor.)
Graduate School of Biomedical Sciences

W. E. Barnett, Director

DEGREES
M.S., Ph.D.

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, cellular, developmental and mammalian biology, and radiation 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.S., 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 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 (5150); 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 at least one of the seminars during each quarter of residence after the first year is strongly recommended.

4. 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.

5. Pass both written and oral comprehensive examinations.

6. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course 6000 is required.

7. A final oral examination on the dissertation.

8. A formal seminar presentation of the dissertation research.

THE 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 (5150); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (5 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.

6. Pass a final oral (oral and written) examination as determined by the student’s committee.

Full-Time Faculty

Professors:
D. Bitter, Ph.D. Tennessee; D. E. Ollin, Ph.D. Rockefeller.

Assistant Professor:
M. D. Mannack, Ph.D. Baylor.

Research Professor:

Research Associate Professor:
C. T. Hadler, Ph.D. Washington.

Research Assistant Professor:
E. A. Hiss, Ph.D. Notre Dame.
Shared Faculty
Not all faculty listed are necessarily available in teaching and/or research roles in every academic year.

W. E. Barnett (Director), Ph.D. Florida State; H. J. Adler, Ph.D. Cornell; J. D. Allison, M.D. Tennessee; W. Au, Ph.D. Cincinnati; G. Braskowsky, Ph.D. Notre Dame; B. Bunick, Ph.D. Pennsylvania; W. G. Carre, Ph.D. Wisconsin; J. D. Crane, Ph.D. Princeton; R. B. Cumming, Ph.D. Texas; J. D. Dunworth, Ph.D. Tennessee; F. Einstein, Ph.D. Harvard; J. L. Eppler, Ph.D. Florida State; R. J. M. Fry, M.D. Dublin (Ireland); R. R. Fujimura, Ph.D. Wisconsin; W. H. Golestan, Ph.D. Oregon; W. M. Generoso, Ph.D. Missouri; D. G. Goostee, Ph.D. North Carolina State; E. H. Grell, Ph.D. California Institute of Technology; R. F. Grell, Ph.D. Tennessee; R. A. Griesemer, D.V.M. Ohio State; W. D. Gude, M.S. Tennessee; F. C. Hartman, Ph.D. Tennessee Medical Units; B. Hingerty, Ph.D. Princeton; A. Hollander, Ph.D. Wisconsin; J. M. Holland, D.V.M. Kansas State; A. W. Heise, Ph.D. Indiana; K. D. Jacobsen, Ph.D. Johns Hopkins; S. Kennel, Ph.D. California (San Diego); F. T. Kenney, Ph.D. Johns Hopkins; P. A. Lailey, Ph.D. New York (Buffalo); F. W. Lamir, Ph.D. Florida State; K. L. Lee, Ph.D. Tulane; J. W. Longworth, Ph.D. Scheffiel (England); C. G. Lusbaugh, M.D. Chicago, A. C. March, Ph.D. Connecticut; W. E. Masser, Ph.D. Rochester; P. Mazur, Ph.D. Harvard; T. J. Mitchell, Ph.D. Wisconsin; M. D. M. Nix, Ph.D. Oregon State; S. K. Niyogi, Ph.D. Northwestern; E. F. Oalkberg, Ph.D. Iowa State; T. T. Odell, Ph.D. Indiana; H. Peck, Ph.D. Utah; R. A. Pope, Ph.D. Michigan; R. J. Preston, Ph.D. Reading (England); S. Robinson, Ph.D. Regan; P. R. Rehage, Ph.D. Hawaii; C. R. Richardson, Ph.D. New Mexico; L. B. Russell, Ph.D. Chicago; W. L. Russell, Ph.D. Chicago; G. A. Segel, Ph.D. Louisiana State; J. K. Selkirk, Ph.D. Syracuse; L. Shugart, Ph.D. Tennessee; L. H. Smih, Ph.D. Syracuse; F. L. Snyder, Ph.D. Wisconsin; D. W. North Dakota; A. Stevens, Ph.D. Western Reserve; J. B. Storer, M.D. Chicago; A. A. Swenson, Ph.D. Stanford; T. Turner, Ph.D. Vanderbilt; R. L. Tynhill, Ph.D. Pennsylvania State; R. L. Ulrick, Ph.D. Rochester; V. R. UPSolu, Ph.D. Indiana; D. S. Vang, Ph.D. Duke; L. C. Waters, Ph.D. Georgia; C. H. Wei, Ph.D. Wisconsin; H. Witschi, M.D. Berne (Switzerland); W. K. Yang, Ph.D. Tulane.

5000 Thesis (1-15) EN/EN only. E
5070-80 Physical Chemistry (3, 3) Thermodynamics, phase equilibria; chemical equilibria, extraction of fundamental principles; adsorption, surface chemistry, electrolyte solutions, kinetics, conductance, viscosity, diffusion.
5140 Biophysics (3) Energy levels and excited states of large molecules; optical instrumentation; adaptations to system perturbations; properties of macromolecules in solution; molecular conformations; intramolecular forces; physical principles of microscopy. Prereq: 5070-80.
5150 General Genetics (3) Mendelian genetics, mitosis, and meiosis. Transmission genetics, mapping, linkage.
5170 Molecular Genetics (3) Molecular biology of genetic processes. Gene regulation; coding, protein synthesis; suppression of nonsense mutations; mutagen mechanisms; complementation; recombination. Prereq: 5110-20, 5160.
5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organs of eukaryotic cells. Pertinent instruments and techniques; cyclic nucleotide metabolism; chromosome structure; nuclear RNA metabolism; nucleoli and ribosome biogenesis; survey of specialized cells. Structure, function, and regulation of transcription and translation in bacteria. 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.
5310-30-40 Biomedical Sciences Laboratory (3, 3, 3, 3) To acquaint students with both theoretical and practical aspects of recombination, chromosome structure and recombination. Prereq: Introductory statistics or consent of instructor.
5340-60-90 Graduate Research Participation (3, 6, 9) Special advanced research project covering theoretical and practical aspects developed on any subject of mutual interest to individual students and staff members. May be repeated.
5510-20-30-40 Special Topics in Biomedical Sciences (3, 3, 3, 3, 3, 3) Tutorials or formal lectures. Potential topics: regulation of enzyme expression and crystallization; excited-state biophysics; physical chemistry of macromolecules; computer science; pathology. Interdisciplinary studies: 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.
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, comparing samples; analysis of variance; contingency tables; chi-square tests; correlation and association; linear regression. Prereq: Introductory statistics or consent of instructor.
6000 Doctoral Research and Dissertation (3-15) NP only. E
6200 Nucleic Acid Chemistry (3) Chemistry of nucleotide-derived materials including alkylation, sotolysins, oxidation-reduction, polymerization, synthesis, denaturation and other structure perturbers. Reaction of nucleic acids in above systems with emphasis on relationship of structure and reactivity. Prereq: 5110-20, Coreq: 5080.
6240 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes, enzymatic expression, and nervous tissue. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Prereq: 5110-20.
6251 Molecular Biology of RNA (3) RNA synthesis and metabolism in prokaryotes, eucaryotes, and in viruses. Prereq: 5110-20 or consent of instructor.

Graduate School of Biomedical Sciences 153
Graduate School of Library and Information Science

Ann E. Prentice, Director

**MAJOR**
Library Science

**DEGREE**
M.S.L.S.

The Graduate School of Library and Information Science provides a program leading to the preparation of librarians and information scientists for work in all types of libraries and information centers. The program of study includes a graduate curriculum leading to the degree of Master of Science in Library Science.

**MASTER OF SCIENCE IN LIBRARY SCIENCE**

The goal of the program is to prepare graduates to function effectively in libraries and information centers. The program is designed to enable students to:

1. 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. Understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Understand and apply the principles of management to the library and information center;
4. Assume individual and collective responsibility for the well-being and development of their profession and of professional service.

**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, 24 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option 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 academic libraries, public libraries, school libraries, special libraries and information centers as well as a variety of library and information related activities.

The SREB Academic Common Market applies to applicants from Arkansas, Georgia, West Virginia, and Virginia.

**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 program 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. Foreign applicants are required 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 and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy.

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:
G. E. Estes, M.S.L.S. Kent State; E. E. Maudlin, (Emeritus), M.S.L.S. Illinois; G. R. Purcell, Ph.D.
Case Western Reserve; P. Wilson, Ph.D. Michigan.

Associate Professors:
J. M. Pemberton, Ph.D. Tennessee; A. Prentice, D.L.S. Columbia; W. Robinson, Ph.D. Illinois;
G. M. Sinkankas, Ph.D. Pittsburgh.

Assistant Professors:
M. H. Karranbrock, Ed. D. Georgia; M. S. Stephenson, Ph.D. North Texas.

**Courses**

4140 Libraries and Librarianship (3) Librarianship as an occupation: its organization, responsibilities, problems and prospects. F, W, Su

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.) W, Su

4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections. F, W

4310 History of the Book (3) History of writing and various methods of bookmaking from earliest times through 19th century. W

4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries. F, W, Su

4750 Utilization of Instructional Media (3) Same as Curriculum and Instruction 4750 and Vocational-Technical Education 4750.) E

5000 Thesis (1-15) F, N/P only. E

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. E
relationship of staff, materials, and user space requirements. Sp, Su


5510 Nonbook Resources (3) Selection, processing, storage and utilization: films, video technology, sound recordings and microforms as information media. Prereq: 5500 or consent of instructor. F, Sp

5515 Serials (3) Serials collections: selection, acquisition, bibliographic control, process, storage, maintenance, and public service. Prereq: 5500 or consent of instructor. W

5520 Contemporary Publishing (3) Creation, production, marketing, and distribution of materials acquired by libraries, with special attention to various types of publishers. F

5540 Archives and Manuscripts (3) Problems involved in acquisition, organization, description, storage, preservation and utilization. Prereq: Consent of instructor. W

5550 Records Management for Information Professionals (3) Functional elements and objectives of records management within organizations, emphasizing control of creation, distribution, retention, storage, retrieval, protection, and disposition regardless of medium. Prereq: 4330, 4270, or consent of instructor. W

5565 Development of Children's Literature (3) Children's literature from earliest times to 20th century. Representative titles of particular periods. W


5625 Resources for Young Adults (3) Critical survey of library materials for young adults with emphasis on personal, vocational and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries. W

5635 Library Services and Programs for Youth (3) Philosophy and objectives of public and school library services for children and young adults. Reading, listening and viewing guidance for individuals and groups. Program planning, implementation and evaluation. Prereq: 5615 or 5625 or consent of instructor. W

5645 Traditional Literature and Oral Narration (3) Nature of traditional materials and principles of collection, reference sources for folk literature; history and techniques of storytelling; use of traditional materials with all age groups. F

5691 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 5691.)

5700 Automation of Library Processes (3) Computer concepts and operations; applications to basic library operations: acquisitions, catalogs, circulation and serials. Coreq: 4270, 5500, or consent of instructor. W, Su

5710 Introduction to Information Science (3) Content and method of information science: application of research findings to general library practice. F, Su

5715 Information in Society (3) Characteristics of information society, nature of knowledge and information, use and effect of media. W

5720 Information Systems Analysis and Design (3) Examination of tools and technologies in library/information center systems planning and implementation. Role and training of systems analyst, systems study from planning through implementation and evaluation, and related topics. Prereq: 5700 or consent of instructor. W

5725 Organization of Materials for Information Storage and Retrieval (3) Principles and techniques in organization and description of materials for input to information storage and retrieval systems: indexing, abstracting, document representation, thesaurus construction and maintenance, related topics. Prereq: 5710 or consent of instructor. W

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing performance of systems to arrive at generalizations with respect to theory, design and operation of information retrieval systems. Sp

5750 Information Technologies (3) Computer-based and non-computer related media and methods for information storage, retrieval, and transfer within and external to library environment; existing and prototype hardware and software and interfacing of these technologies. Prereq: 5700 or consent of instructor. W

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. E
MASTER OF SCIENCE IN PLANNING

The M.S.P. degree program prepares planners for a diversity of career opportunities in both the public and private sectors. Graduates are candidates for professional positions in regional, city, county, and metropolitan planning agencies; in local, state, and federal agencies concerned with physical and administrative planning; in private business and organizations dealing with development problems; and in private consulting practice.

The degree program typically requires a minimum of six quarters, or 72 credit hours. A core curriculum of 40 hours is required of all candidates. Twenty-three or more additional hours of elective course work and 9 hours for candidates.

Elective courses are chosen with the advice of development, public administration, and public health. Elective courses are chosen with the advice and approval of the student's faculty advisor.

A work internship is recommended, but not required, during the summer between the first and second year of the program. Students who do not have prior experience in comprehensive plan preparation are advised to enroll in an intensive credit-hour synthesis project course. The required thesis or major paper option provides the student an opportunity to develop and apply research and analytical skills to a particular planning problem or topic.

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, experienced professional planners in TVA and other public and professional organizations frequently teach courses on a visiting basis. Each year a guest lecture series brings to the University and the School outstanding leaders in the fields of planning and development.

The Graduate School Planning is accredited by the American Planning Association.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Reference letters should be from teachers familiar with the applicant's undergraduate or, where applicable, graduate academic record. If the applicant has had prior planning experience, a letter from a supervisor or other person familiar with the work of the applicant should also be provided.

Graduate Record Examination scores are not required, but, if available, may be provided at the option of the applicant. All applicants are also requested to submit a statement of career goals.

The M.S.P. degree is approved for SREB Academic Common Market participation in Arkansas, Georgia, Kentucky, and West Virginia.

All inquiries concerning admission should be addressed to: Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37996-3306.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment at the Graduate School of Planning Research Center, at local planning agencies, the Tennessee Valley Authority and Oak Ridge National Laboratory may provide an opportunity for selected students to obtain part-time experience while pursuing the degree. Such employment, however, usually extends the period required to complete the degree.

A limited number of graduate assistantships are available through the School.

Assistantships carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in School of Planning assignments. Applicants interested in being considered for assistantships and other forms of financial assistance available through the School should submit an application for financial aid to the Director.

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit of which 46 hours must be in courses offered in planning.

The following courses are the required core curriculum for the M.S.P. degree: 5100, 5110, 5130, 5141, 5180, 5270, 5280, 5340, 5440, 5465. Students who have had previous academic work equivalent to any required core course may petition for a waiver, which can be granted upon demonstration of competence. A proficiency examination may be arranged for students wishing to receive academic credit for previous work.

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 plan the student must have completed at least 48 hours of graduate course work and have attained at least a 3.5 cumulative grade point average (at the time of approval of the major study proposal) in at least 24 hours of planning core curriculum courses. The student meeting these criteria may present a proposal to his/her committee for a major study which will include at least 9 hours of subsequent elective course work related to the study topic. The proposal shall justify the selection of topic, problem or issue and the approach to the study.

Students in the Graduate School of Planning must pass a comprehensive written examination after approximately five quarters of course work.

Faculty

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. F

5000 Thesis (1-15) P/NP only. E

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. E

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. F, Su

5040 Communications for Planners I (1) Introduction to basic communications, interpersonal and oral communications, graphic presentations, audiovisual equipment. W

5045 Communications for Planners II (1) Graphic communications in planning. Maps and mapping, computer graphics, models and presentation graphics. Prereq: 5040. W

5050 Communication for Planners III (1) Audiovisual equipment, programmed communications, and photography used in planning. Prereq: 5045. E

5100 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 5110. W

5110 Introduction to Planning (4) History of planning, familiarization with operations of contemporary planning, concept of systems, current trends and issues, and relationships between planning and society in which it occurs. Designed for GSP students. F, Su

5130 Planning Research Methods I (3) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making. F, Su


5141 Statistics for Planners (4) Applications of basic descriptive and inferential classical and nonparametric techniques in planning research. Data organization and display; measures of location, dispersion and association; data transformations; some basic probability theory; selected one and two sample tests; correlation and regression analysis. Prereq: 5130 or consent of instructor. W

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. F

5160 Planning and Utilities (3) Planning for adequate water supply and sewage waste disposal in the urban environment. Impact of utility patterns on area development, and problems of utility service policies.

5170 Planning for Historic Preservation (3) Planning for preservation and restoration and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local government role in preservation, designation of sites, legislative needs, financing and administrative organizations.

5180 Planning Analysis and Forecasting (4) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, and economic base studies with emphasis on forecasting techniques. Prereq: 5130. Sp

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 from public or written regulations. Extensive laboratory experience. F, Sp, Su

5235 Advanced Urban and Site Design (3-6) Review of principles of urban and site design and laboratory application to selected projects of projects involving three dimensional integrated planning of movement systems, activity patterns and land use. Prereq: 5230 or consent of instructor.

5270 Planning and Transportation (3). (Same as Civil Engineering 5270-) W

5280 Planning Methods (6) Tooling up studies; methods for preparation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5180. Sp

5300 Regional Planning (3) Making planning process operable in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by states, single-purpose agency planning, and TVA. Prereq: 5110 or consent of instructor.

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: 5110 or consent of instructor.

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. W

5380 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. experiences. 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.

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. E

5430 Planning and Government (3) Governmental context within which planning occurs. Policy making as public process. Planning structures, powers, and policies. F

5440 Planning and Land Use Controls (4) Legal basis for planning and guiding community development. Exercise of police power and eminent domain. Development and administration of zoning, subdivision controls, and related devices. Prereq: 5455. F, Su

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. Partnerships roles of public and private sectors in urban development and redevelopment. Prereq: 5440. F

5500 Synthesis (6) 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. F, W

5670 Social Planning (2-3) 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, social services. Prereq: Consent of instructor. (Same as Social Work 5670.)
GRADUATE SCHOOL OF SOCIAL WORK

Ben P. Granger, Dean
Lou M. Beasley,
Branch Director, Nashville
M. Kate Mullins,
Branch Director, Memphis
Roger M. Noce,
Branch Director, Knoxville
Ronald K. Green,
Director, Office of Continuing Social Work Education

MAJOR DEGREES

Social Work M.S.W. Ph.D

THE MASTER'S PROGRAM

The University of Tennessee School of Social Work is a fully accredited two-year graduate professional school, with a program (thesis or non-thesis option) leading to the degree of Master of Science in Social Work. The full two-year curriculum is offered in all three branch locations.

GRADUATE PROFESSIONAL EDUCATION

The School of Social Work has as its primary objective the education and training of persons for leadership in the social welfare profession and the social work practice community. Leadership roles include positions in social welfare administration, social planning and policy development, and positions as treatment team leaders, supervisors, consultants, and expert practitioners.

Central to professional leadership are a commitment to the values and goals of the profession and the development of a comprehensive and broad knowledge base upon which to operate in the future as practitioners and planners. 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, Henson Hall, Knoxville, Tennessee 37996-3333.

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; 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 an opportunity to elect a concentration emphasis in a field of practice.

THE PROFESSIONAL FOUNDATION

The professional foundation is a 30-quarter hour sequence of five basic courses required of all students before entering either of the concentration programs. As the initial phase of the school educational program, the foundation 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 administrators, and planners.

THE REQUIRED CONCENTRATION

Upon completion of the foundation curriculum (at the beginning of the third quarter), each student selects a concentration in either social work treatment or social welfare administration and planning and devotes the final four quarters of the program to required concentration courses and electives. Students must take 12 hours in their required concentration and may take courses in the other required concentration as electives. Although each branch offers a variety of elective courses, not every elective is offered every year at every branch.

Spring Quarter, First Year
5960 Field Practice 3
5110 Social Welfare Policy and Services I 3
5210 Human Behavior and Social Environment I 3
5410 Social Work Practice I 3
5910 Field Practice 2
TOTAL QUARTER HOURS 15

Fall Quarter, Second Year
5920 Field Practice 4
5420 Social Work Practice II 3
5120 Social Welfare Policy and Services II 3
5220 Human Behavior and Social Environment II 3
5940 Field Practice 4
TOTAL QUARTER HOURS 14 or 15

Winter Quarter, First Year
5860 Social Work Research II 2
5120 Social Welfare Policy and Services II 3
5220 Human Behavior and Social Environment II 3
5420 Social Work Practice II 3
5920 Field Practice 4
TOTAL QUARTER HOURS 15

Credit Hours

Spring Quarter, First Year
5930 Field Practice 3
5110 Social Welfare Policy and Services I 3
5210 Human Behavior and Social Environment I 3
5410 Social Work Practice I 3
5910 Field Practice 2
TOTAL QUARTER HOURS 13 or 14

Fall Quarter, Second Year
5940 Field Practice 4
5420 Social Work Practice II 3
5120 Social Welfare Policy and Services II 3
5220 Human Behavior and Social Environment II 3
5930 Field Practice 4
TOTAL QUARTER HOURS 14 or 15

Winter Quarter, Second Year
5950 Field Practice 4
5961 Integrative Seminar 2
One Elective 2 or 3
TOTAL QUARTER HOURS 10 or 11

AREAS OF SPECIALIZATION

Social Work Treatment

The social work treatment concentration provides the educational basis for practice with individuals, families, and groups in order to enhance their social functioning, ameliorate problems, and prevent social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methodology basic to varied individual, family, and group methods applicable in the treatment of diverse client problems.
Social Welfare Administration and Planning

The social welfare administration and planning concentration provides the educational basis for leadership in the design, implementation, and continued delivery of effective human service programs at local, state, and regional levels. This concentration emphasizes theory and skills related to administration and planning, and permits considerable flexibility in tailoring a program to fit the student's individual interests, capabilities, and career goals.

FIELD PRACTICE

Field instruction is a critical component of the student’s first- and second-year program. Because of the UT School of Social Work’s cooperation 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 ensure that the student has a quality field practice experience which will contribute to 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 field practice during each of 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 the 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. Completion of each required course at a satisfactory level (a grade of C or above).

Graduate courses may not be repeated to raise a grade.

5. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
6. Students who elect a non-thesis option must pass a written comprehensive examination.
7. 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.
8. The minimum number of credit hours required for a degree shall be 72 hours including a maximum of 36 S/NC hours.
9. Performance at a satisfactory level in field practicum, which is designed to teach professional practice skills.

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 substantial 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.
2. A grade point average of 2.5 on a 4.0 scale.
3. Personal qualifications acceptable for entrance into the professional practice of social work.

Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed no later than March 1 of the year in which admission is desired.

THE ADMISSIONS PROCESS

Individuals who wish to be considered for admission must submit the appropriate application materials from the Office of Admissions, UT School of Social Work, Henson Hall, Knoxville, TN 37996-3333, telephone (615) 974-3175, or one of the Branch offices. Beginning students are admitted only in the fall quarter. Applications for first-year admission should be filed as early as possible. A minimum of six weeks should be allowed for consideration of the application.

Students intending to apply for financial aid are encouraged to apply for admission to the School as early as possible. By doing so, students should be able to meet financial aid deadlines, many of which are April 1 for September funding.

To apply for admission, applicants should forward the completed Graduate School Application and payment of a nonrefundable $10 application fee to The Graduate School, The University of Tennessee, Knoxville, Two official transcripts of all undergraduate, graduate, and extension work (except work taken at The University of Tennessee, Knoxville) should be sent to The Graduate School immediately after filing the Graduate Application for Admission.

The completed University of Tennessee School of Social Work Application for Admission and three reference forms should be returned to the Admissions Office of the School of Social Work.

If a personal interview is required by the School, the applicant will be contacted by a representative of the School and arrangements will be made concerning a time and place. Applicants may request a personal interview with a faculty member if they wish.

ACCELERATED PROGRAM

The University of Tennessee School of Social Work has a special accelerated program which enables eligible candidates to complete the M.S.S.W. degree in four quarters. This Accelerated Program is approved by the Council on Social Work Education.

Students who qualify for the Accelerated Program must:
1. Have achieved a 3.0 or above grade point average (on a 4.0 scale) in undergraduate work.
2. Have completed an undergraduate major in social work from a program accredited by the Council on Social Work Education, or an undergraduate major in a related area which included a supervised field practice component, or have completed at least two years of full-time employment in social work practice.
3. Pass a qualifying examination administered by the School of Social Work faculty in early spring.

The accelerated programs begin in the Knoxville and Memphis branches in March and in the Nashville Branch in June 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 is through the regular admission process. Applications should be filed no later than December 31 for the Memphis and Knoxville programs, and not later than January 31 for the Nashville program.

PART-TIME PROGRAM

Planned part-time programs are available in all three branches of the School. Admission requirements are the same as for full-time study. Course work can be completed over a three- or four-year period. Applications should be made to the School as outlined above.

TRANSFER CREDITS

Courses completed in another accredited graduate 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. If previous courses are equivalent to required or elective courses offered here, the University of Tennessee School of Social Work allows a maximum of 45 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 course work must be completed within the six-year period prior to the receipt of the
THE DOCTORAL PROGRAM

The UT School of Social Work offers a Doctor of Philosophy degree with a major in Social Work. This newly approved Ph.D. program began fall quarter, 1983.

The focus of social work education at the doctoral level is to foster the development within students of an attitude of scientific inquiry, competence in applying scientific method to improve and extend the knowledge base of social work practice and commitment to reflect this attitude, and competence in leadership roles in social work education, research, and practice.

The character of the UT School of Social Work doctoral program will be derived from its focus upon:

—Analysis and evaluation of the interrelationships between direct intervention and administration and planning practice and between each of them and their social policy, programmatic, organizational and community contexts.
—Development, within this interrelational framework, or research-based knowledge to inform and guide social work practice, social policy, planning and social welfare program development.

The core courses will be offered in four quarters on the Knoxville campus. After this, students will be assigned to one of the three Branches for an internship and to complete dissertation research under the supervision of qualified faculty. For example, students interested in health care could be assigned to the Memphis Branch where there are opportunities for internships and for research in health care.

Requirements for admission to the doctoral program are being developed. Inquiries and requests for admission should be sent to: Doctoral Program Admissions, UT School of Social Work, Henson Hall, Knoxville, TN 37996-3333, (615) 974-3175.

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:
- R. P. Granger (Dean), Ph.D. Brandeis; M. H. Bloch, M.S. Ohio State; R. C. Bonovich, D.S.W., Washington; G. W. Fryer, Ed.D. Columbia; G. A. Cramer (Emeritus), M.S.W. Western Reserve; M. K. Mullings, Ph.D. Chicago; R. M. Nove, D.S.W. Tulane; B. Orchard (Emeritus), M.S. Western Reserve; H. Rubenstein (Emeritus), Ph.D. Chicago; S. W. Spencer (Emeritus), M.S. New York School of Social Work

Associate Professors:
- G. W. Ayres, D.S.W. Tulane; J. M. Beastley, Ph.D. Denver; W. J. Beil, D.S.W. Tulane; J. C. Cates, Ph.D. Michigan; M. Celingog, Ph.D. Washington; T. C. Cruthird, D.S.W. Tulane; J. C. Eades, Ph.D. Southern Illinois (Carbondale); C. Eaves, Ph.D. Michigan; D. C. Feist, Ph.D. Pittsburgh; R. K. Green, J.D. Tennessee; C. F. Haisman, Ph.D. Western Reserve; L. D. Harrison, Ph.D. Western Reserve; L. D. Harris, N.S.W. Minnesota; H. Hirayama, D.S.W. Pennsylvania; E. A. Moses, D.S.W. California (Berkeley); R. W. Rowen, Ph.D. Arizona; N. F. Tate, Ph.D. Brandeis; H. H. Wilkens, Ed.D. Memphis State; A. R. Wachter, M.S.S.W. Tennessee; C. C. Lewis; G. P. Zarbock, M.S.W. Wisconsin

Assistant Professors:
- P. M. Campbell, M.S.S.W. Tennessee; J. Chapping, Ph.D. Peabody; J. C. Collier, M.S.W. Tulane; H. P. Copes, Ph.D. Western Reserve; C. Faust, M.S.S.W. Tennessee; A. R. Ford, M.S.W. Atlanta; D. Gates, M.S.S.W. Tennessee; D. Itohberg, Ph.D. Washington; D. C. Johnston, M.S.W. California (Berkeley); C. Lowry, M.S.S.W.; J. R. Middlet, M.S.W. Ohio State; M. P. Strong, M.S.W. Tulane

Courses

5000 Thesis (1-15) F/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered in the program. May be repeated. Maximum 3 hrs. S/NC only. E

5070-40 Social Work Research I, II, (3) Research methodology as applied to problems in social welfare. Problem formulation; research design; instrument construction; data collection, analysis, and presentation; and research reporting. F, W

5081 Evaluative Research in Social Work (2-3) Advanced research course. Topics include sociopolitical and organizational context of evaluative research, research design, methodology appropriate to evaluative research, and utilization of research findings. Prereq: Completion of core or consent of instructor. Sp

5082 Practicum in Social Work Research (3-4) Supervised practice in application of research methods and tools to social welfare program. Problem may be generated by faculty, students, or social welfare agency or organization. Prereq: 5070-40 and consent of faculty member conducting investigation. S/NC only. Sp

5083 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 4 hrs. F, W, Sp

5090 Social Problems in Social Work (2-6) Individual study or research on problems of special significance to the student, under supervision of major professor. May be repeated. F, W, Sp

5110 Social Welfare Policy and Services I (3) Interests of social work profession in development of contemporary social policy at local, state, national, and international levels of organization. Prereq: Completion of core or consent of instructor. Sp

5120 Social Welfare Policy and Services II (3) Examination of theories of complex organizations applied to social welfare service delivery settings. Prereq: 5110. F

5130 Human Behavior and Social Environment I and II (3, 3) Examination of theories pertaining to individual, family, and small group within context of functions, roles and processes. Behavior of these systems conceptualized along functional-dysfunctional and normal-deviant continuum. Organizing themes, development and maturation, adaptive and deviant mechanisms. Open system approach used to understand interrelationships of biological, psychological, and social variables with emphasis on implications of culture and ethnicity. F, W

5290 Special Accelerated Program in Social Work (15) Ten-week program providing qualified students with intensive study and supervised field experience that qualifies them to enter second year of graduate study upon successful completion of this term. S/NC only.

5310 Human Behavior and Social Environment (2-3) Describes and extends student's knowledge of adaptive and nonadaptive behavior; continuum of behavior from optimum social functioning to pathology. Prereq: Second-year status. May be repeated.

5311 Imaginative Perspectives on the Human Condition (2-3) Examination of usefulness to social work students of prose, drama, and poetry, which illuminates and expands knowledge and appreciation of every person's humanness. Adaptive and maladaptive response to ordinary and extraordinary life situations and events, portrayed by creative writers. Artistic representation of molding of human personality and spirit through interaction of persons with one another and with the environment. Prereq: Completion of core or consent of instructor.

5312 Psychopathology and Social Deviance (2-3) Theories and recent research in etiology of physical and social variance. Categorical approach to psychopathology examined and differentiated from other approaches to human behavior. Prereq: Completion of core or consent of instructor.

5313 Deviant Behavior of Children and Youth (2-3) Describes and extends student's knowledge and social attitudes toward sexual behavior, clinical problems and approaches to deal with clients better able to deal with clients with sexual problems. Prereq: Completion of core or consent of instructor.

5410 Social Work Practice I (3) Basic theory, values and skills development generic to social work intervention at various system levels. Combines classroom skills and laboratory experiences.

5420 Social Work Practice II (3) Assessment, planning, implementation and evaluation of programs. Prereq: Completion of core or consent of instructor. W

5441 Transactional Analysis (2-3) Philosophy, theory, and therapeutic technique of transactional analysis. Prereq: Completion of core or consent of instructor.

5442 Short-Term Treatment (2-3) Theory and practice of short-term treatment focusing on the nature of methods, characteristics of clients responsive to this approach, and the role of the social worker in a short-term treatment setting. Prereq: Completion of core or consent of instructor.

5443 Seminar on Behavior Therapy (2-3) Behavior modification methodology applied to clinical assessment, choice of designs to assess treatment in-
tentions, skill in evaluating data on effectiveness of treatment interventions. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 6 hrs. Sp.

544 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 are possible. Prereq: Completion of core or consent of instructor.

5460 Social Work Treatment with Individuals and Families (3) Social work literature, social casework as form of social work practice and as form of interpersonal treatment. Prereq: Completion of core or consent of instructor. Sp.

5470 Contemporary Treatment Modalities: Individual and Family (2-3) Well-established and developing treatment modalities in terms of essential concepts. Differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor. F.

5480 Special Topics in Social Work Treatment (2-3) Treatment with individuals, families, and small groups. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp.

5560 Social Work Treatment with Groups (3) Development of knowledge and skill in use of group methods in social work practice; organization and forming group, structuring group tasks and experiences. Prereq: Completion of core or consent of instructor. Developing, enabling problem-solving effectiveness, facilitating transfer of change, and evaluating individual change and group change. Prereq: Completion of core or consent of instructor. Sp.

5561 Interpersonal Skill Development (2-3) Training group employed to enhance interpersonal competence in application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

5570 Comparative Methods of Group Treatment (2-3) Comparative analysis and critical review of theory and methodology of some of major group treatment modalities with emphasis on theory-base, leadership, techniques and procedures, and research. Prereq: Completion of core or consent of instructor. A.

5601 Social Work 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. W.

5681 Community Organization (2-3) Using behavioral and social science knowledge about communities and organizations to assist in development of resources to meet community and human needs. Prereq: Completion of core or consent of instructor. Sp.

5670 Social Planning (2-3) (Same as Planning 5670). F.

5671 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. F.

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 skills for coping with variety of situations. Prereq: Second-year administration/planning or consultation sessions, or consent of instructor; 5761 or equivalent. S.

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 systems, supervisee, and executive, problems of middle management position of supervisor. Differences and similarities in supervision at various 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. A.

5742 Consultation in Social Work (2-3) Constella- tion of roles, relationships, and behaviors required of consultant. Consultation as distinguished from supervision, administration, and 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 services programs and agencies. Personnel recruitment, selection, appointment, and supervision; staff development, training, and evaluation; salary and benefit systems; employer-employee relations; and fair employment practices. Prereq: Completion of core or consent of instructor. W.

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 administration; developmental approaches to teaching and learning; measurement issues; models and styles of education. Prereq: Completion of core or consent of instructor. W.

5741 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. Sp.

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. W.

5760 Social Welfare 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.


6140 Seminar on Areas of Practice (3) Compar- ative analysis of knowledge requirements for service delivery in specific areas of practice. Sp.

6210 Advanced Seminar in Areas of Practice (3) Impact of social contexts on service delivery in selected area of practice. May be repeated. Max- imum 9 hrs.

6220 Seminar/Pacticum in Social Work Education (2-3) Curriculum issues and teaching methods; classroom experience in social work teaching.