471 Sociolinguistics (3) Study of language in relation to society. Empirical and theoretical focus. Large-scale units: tribes, nations, social groups. Prereq: 371 or 372

470 Special Topics in Rhetoric (3) Topics vary. Prereq: Advanced Expository Writing or consent of instructor. May be repeated with different topics. Maximum 6 hrs. (Same as Language and Literature 470.)

466 Writing, Layout, and Production of Technical Documents (3) Principles of design for desktop publishing. Production of final documents to be incorporated into professional portfolio. Prereq: Technical and Professional Writing or consent of instructor.

464 Advanced Fiction Writing (3) Further development of skills acquired in basic fiction writing course. Prereq: 365 or consent of instructor.

462 Writing for Publication (3) Principles and practices of writing for publication. Dissertations, theses, articles, and reports in science and technology. Prereq: Technical and Professional Writing or consent of instructor.

430 Modern American Literature (3) World War I to present.

435 American Novel before 1900 (3) From earliest sentimental novels through Brown and Cooper, and major figures to 1900: Hawthorne, Melville, Twain, Howells, James, Stowe, Emerson, Thoreau, Douglass, Whitman, and Dickinson.

434 Modern American Literature (3) Fiction in English translation from such writers as Kafka and Camus through contemporary authors.

432 American Romanticism and Transcendentalism (3) Major issues and figures in American literature from c. 1830, for students with a background in American literature. Prereq: Consent of instructor.

431 Colonial, Federal, and Early National American Literature (3) From Columbus to Washington Irving.

422 Women Writers in Britain (3) Literary consciousness and works of women writers in Britain. Topics vary: Mary Wollstonecraft, Harriet Martineau, Elizabeth Gaskell, Jane Austen, and others. May be repeated with different topics. Maximum 6 hrs. (Same as Women's Studies 422.)

413-14 Readings in Medieval Literature (3, 3) Reading and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English. May be repeated. Maximum 9 hrs. each.

513-14 Readings in Medieval and Renaissance Literature (3, 3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

520-21 Readings in Renaissance and Early Modern Literature (3, 3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

530-31 Readings in Renaissance and Early Modern Literature (3, 3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

532 Special Topics in Writing (1-3) Topics vary. May be repeated. Maximum 6 hrs. Enrollment by consent of director of graduate studies only.

533 Special Topics in Literature (3) Topics vary. May be repeated. Maximum 6 hrs. Each.

530 Readings in Modern American Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

560-61 Readings in Modern American Literature (3, 3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

552 Readings in Black American Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

546 Contemporary and Postmodern Literature (3) Studies in literature written after World War II. Content will vary. May be repeated with different topics and instructors. Maximum 6 hrs. (Same as Literature 546.)

545 Persuasive Writing (3) Writing and analyzing persuasive texts in public, professional, and academic contexts. Prereq: Advanced Expository Writing or consent of instructor.

544 Special Topics in Writing (3) Original writing integrated with reading, usually taught by professional author. Topics vary. May be repeated. Maximum 6 hrs.

543 Special Topics in Literature (3) Topics vary. May be repeated. Maximum 6 hrs.

542 Modern Drama, 1880-1945 (3) Survey of British, American, and international drama from the advent of modern drama to the end of World War II.

541 Modern Drama (3) From Yeats and Proust to Tennessee Williams, and contemporary writing.

540 Readings in English Literature of the Nineteenth Century I and II (3, 3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

539 Readings in the Restoration and Eighteenth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

538 Readings in the Seventeenth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

537 Readings in the Sixteenth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

536 Readings in the Fifteenth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

535 Readings in the Fourteenth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

534 Readings in the Thirteenth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

533 Readings in the Twelfth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

532 Readings in the Eleventh Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

531 Readings in the Tenth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

530 Readings in the Ninth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

529 Readings in the Eighth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

528 Readings in the Seventh Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

527 Readings in the Sixth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

526 Readings in the Fifth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

525 Readings in the Fourth Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

524 Readings in the Third Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

523 Readings in the Second Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

522 Readings in the First Century (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

521 Readings in the Pre-Christian Period (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

520 Readings in the Proto-History (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

519 Readings in the Prehistory (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

518 Readings in the History of Writing (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

517 Readings in the History of Language (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

516 Readings in the History of Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

515 Readings in the History of Thought (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

514 Readings in the History of Ideas (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

513 Readings in the History of Philosophy (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

512 Readings in the History of Religion (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

511 Readings in the History of Science (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

510 Readings in the History of Art (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

509 Readings in the History of Music (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

508 Readings in the History of Dance (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

507 Readings in the History of Theatre (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

506 Readings in the History of Film (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

505 Readings in the History of Television (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

504 Readings in the History of Radio (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

503 Readings in the History of Print (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

502 Readings in the History of Writing (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

501 Readings in the History of Language (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.
Entomology and Plant Pathology
(College of Agricultural Sciences and Natural Resources)

MAJOR

Entomology and Plant Pathology

DEGREE

Charles D. Pless, Acting Head

Professors:

Bernard, Ernest C., Ph.D. ... Georgia
Gerhardt, Reid R. (Liaison), Ph.D. ... NC State
Grantham, Jerry F., Ph.D. ... Clemson
Hilly, James M. (Emeritus), Ph.D. ... Ohio State
Johnson, LaFond F. (Emeritus), Ph.D. ... LSU

Associate Professors:

Gwin, Kimberly D., Ph.D. ... NC State
Owens, Bonnie H., Ph.D. ... NC State
Reddick, Bradford B., Ph.D. ... Clemson
Windham, Mark T., Ph.D. ... NC State

Assistant Professor:

Perea, Roberto M., Ph.D. ... Florida

The Department of Entomology and Plant Pathology offers a graduate program leading to the Master of Science with a concentration in entomology or plant pathology. Students in entomology may specialize in crop entomology, medical and veterinary entomology, insect biology, insect pest management, or biological control. Students in plant pathology may specialize in foliar and stem fungus diseases, soilborne pathogens, disease physiology, biocontrol, plant nematology, or virology. For specific information, contact the department head.

THE MASTER'S PROGRAM

Admission Requirements

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed (1) general botany or biology, 8 hours; (2) advanced biological sciences, 8 hours; (3) general inorganic chemistry, 8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.

Degree Requirements

The program requires a written thesis based on original research and the completion of a minimum of 24 hours of coursework for graduate credit, approved by the student's advisory committee. Included in the course requirements are two acceptable seminar presentations for 1 hour each. An oral final exam must be passed to the satisfaction of the advisory committee after the thesis has been completed. A minor is not required but may be selected at the option of the student. The minor will include at least 8 hours and not more than 10 hours of graduate-level credit in the minor department. The student's committee will include a member of the faculty from the minor department to assist in designing courses required for the minor.

GRADUATE COURSES

410 Diseases and Insects of Ornamental Plants (3) Symptoms, identification, and management of diseases and insect pests that affect plants in greenhouses, nursery, and landscape environments. Prereq: Plant Pathology or Economics Entomology or consent of instructor. Sp

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Sp/A

510 Plant Disease Fungi (4) Morphology, taxonomy, biology, and genetics of plant pathogenic fungi. Isolation and identification of plant pathogenic fungi. Prereq: 313 or consent of instructor. 2 hrs and 2 labs. (Same as Ornamental Horticulture and Landscape Design 511.) F, A

512 Soilborne Plant Pathogens (3) Causal agents: host-parasite-soil environment interactions; epidemiology; behavior; cultural controls; and chemical control. Prereq: Plant Pathology or consent of instructor. F, A

514 Bacterial Plant Diseases (4) Morphology, taxonomy, ecology, physiology, and genetics of bacterial plant pathogens; infection and disease development, pathogenesis, resistance, disease diagnosis, detection, effect of environment, and management of bacterial plant diseases; beneficial plant-bacterial interactions. Prereq: Plant Pathology or consent of instructor. 3 hrs and 1 lab. Sp, A

515 Physiology of Plant Disease (3) Biochemical and physiological events involved in pathogen interactions. Mechanisms of disease resistance. Prereq: Introductory plant physiology or pathology, or consent of instructor. F, A

520 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, biology, ecology, and management of plant parasitic nematodes, host-parasite relationships. Prereq: 3 hrs biological science or consent of instructor. 2 hrs and 2 labs. Sp, A

521 Plant Virology (3) Symptomatology, epidemiology, and management of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; serology; plant pathogenic viruses, mycoplasmas and viroids. Prereq: 313 or consent of instructor. 2 hrs and 1 lab. Sp, A

523 Field Crop and Vegetable Insects (2) Identification, life history, interaction of insects with insects and plants, and control of pests of field crops. Prereq: 321 or 325, or consent of instructor. 2 hrs and 1 lab. Sp, A

525 Medical and Veterinary Entomology (3) 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: 321 or 325, or consent of instructor. 2 hrs and 1 lab. Sp, A

530 Integrated Pest Management (3) Principles and application of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest control at economic thresholds. Below economic threshold levels. Prereq: 321, or consent of instructor. (Same as Plant and Soil Science 530.) F, A

531 Special Problems in Entomology (1-3) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

532 Special Problems in Plant Pathology (1-4) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

533 Concentrated Study in Entomology (1-3) Selected subjects in entomology for advanced students, concentrated in time and subject matter. Prereq: 321 or basic entomology course. May be repeated. Maximum 6 hrs. F, Sp

541 Seminar (1) Review of literature and current research in entomology and plant pathology. May be repeated. Maximum 2 hrs. E
The following retention policy applies to all graduate students seeking a degree in the Exercise Science unit:
1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the unit leader of the need to discuss the matter with his/her advisor.
3. If a student’s overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE ASSISTANTSHIPS
A limited number of graduate assistantships are available for 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. Students interested in these opportunities should file their applications before the unit leader. Letters should be addressed to Graduate Assistantships Coordinator, Exercise Science Unit, The University of Tennessee, Knoxville, TN 37996-2700.

MAJORS
(College of Education)

MAJOR
Exercise Science

DEGREES

Graduate students are required to maintain an overall 3.0 GPA. Any student who falls below this standard will be advised in writing by the unit leader of the need to discuss the matter with his/her advisor.
Food Science and Technology

(Major of Agricultural Sciences and Natural Resources)

MAJOR

Food Science and Technology

Clara J. Brekke, Head

Professors:

Brekke, C. J., Ph.D. \( \ldots \) Wisconsin
Collins, J. L., Ph.D. \( \ldots \) Maryland
Davidson, P. M., Ph.D. \( \ldots \) Washington State
Draughon, F. A., Ph.D. \( \ldots \) Georgia
Jaynes, H. O. (Emeritus), Ph.D. \( \ldots \) Illinois
Metson, C. C., Ph.D. \( \ldots \) Kansas State
Metson, S. L., Ph.D. \( \ldots \) Tennessee
Miles, J. T. (Emeritus), Ph.D. \( \ldots \) Wisconsin
Morris, W. C., Ph.D. \( \ldots \) Iowa State
Overcast, W. W. (Emeritus), Ph.D. \( \ldots \) Iowa State
Penfield, M. P., Ph.D. \( \ldots \) Tennessee

Associate Professors:

Loveday, H. D., Ph.D. \( \ldots \) Kansas State
Mount, J. R., Ph.D. \( \ldots \) Ohio State

Assistant Professors:

Golden, D. A. (Liaison), Ph.D. \( \ldots \) Georgia
Hultberg, G. P., Ph.D. \( \ldots \) Illinois
van Laack, R. L., Ph.D. \( \ldots \) Utah

The Department of Food Science and Technology offers the Master of Science and Doctor of Philosophy degrees. Students in the doctoral program may choose research in the concentration areas of food processing, food chemistry, food microbiology or sensory evaluation of foods. Commodity interests (meats, dairy, fruits, vegetables, bakery products) can be emphasized in any of the areas by careful selection of courses and the research topic. Minors are available in cognate fields. For detailed information, contact the department head.

Admission requirements of The Graduate School of ETR apply. In addition, applicants must submit scores from the general section of the Graduate Record Exam (GRE), a written statement of educational and career goals, and Graduate School rating forms or letters of recommendation from at least three people familiar with the applicant's scholastic ability and professional potential. Admission to the program is contingent upon faculty evaluation of the applicant's undergraduate/graduate GPA, GRE scores, rating forms, relevant work experience, and scores from the Test of English as a Foreign Language (TOEFL), if applicable.

THE MASTER'S PROGRAM

Applications must have a B.S. in food technology, food science or a related scientific field.

Thesis Option

1. Prior to research for the thesis, the student must develop a detailed written research plan. Registration for 6 hours of 500 Thesis is required.
2. In addition to the thesis requirement, a minimum of 24 semester hours of graduate coursework is required. The work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.
3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.
4. An oral, final examination covering the thesis and coursework is required.

Non-Thesis Option

1. In lieu of a thesis, students are required to complete a problem in cooperation with their employer (company or governmental agency) and their faculty committee. Students working on a problem must register for 6 hours of 503.
2. In addition to the requirements of 6 hours of 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.
3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.
4. Students will be required to take a written comprehensive examination covering their coursework. In addition, an oral, final examination covering the problem and coursework is required. The oral examination will be held on the Knoxville campus.

THE DOCTORAL PROGRAM

1. Completion of a master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission.
A dissertation is required for the Ph.D. degree. Each student must develop a detailed written plan for the dissertation research. A minimum of 72 hours beyond the Bachelor’s degree, excluding credit for the master’s thesis, is required. Of this, 24 semester hours must be devoted to coursework in the major. Research with a faculty advisor must be taken outside the Department of Food Science and Technology. All candidates must complete 601 (2 hrs.) and are expected to attend 601 during their Ph.D. program.

Each candidate must pass both written and oral comprehensive examinations prior to admission to candidacy. The major professor will advise candidates on competencies expected. A final oral examination is required that includes a defense of the dissertation and subject matter that the student’s committee considers appropriate.

**GRADUATE COURSES**

430 Sensory Evaluation of Foods (3) Principles and methods of sensory evaluation of foods. Prereq: Basic statistics. 2 hrs and 1 lab. F

452 Science of Dairy Foods (3) Science and technology of processing of milk and its products. Prereq: Food Laws and Regulations, Food Chemistry, Food Microbiology and Lab, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp

460 Meat Science (3) Carcass characteristics of meat animals, muscle structure and composition, identification, and quality assurance. Prereq: Food Industry or consent of instructor. Sp

469 Meat Science Lab (1) Slaughter and processing methods for beef, pork, lamb, and poultry. Coreq: 460. Sp

470 Food Crop Products (3) Food products from plant types, manufacturing systems, quality attributes and utility. Prereq: Food Preservation and 3 hrs biological science or consent of instructor. 2 hrs and 1 lab. Sp

480 Cereal Science and Bakery Products (3) Chemistry and technology of processing cereal grains, interactions of ingredients during production and storage of baked products. Prereq: Food Laws and Regulations, Food Chemistry, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp

490 Food Laws and Regulations (3) Laws and regulations designed to preserve safety, wholesomeness, and nutritional quality of United States food supply; precedent case studies and their impacts on laws and regulations. Prereq: The Food Industry; consent of instructor for non-majors. Recommended prereq: Core courses in Food Science and Technology. F

495 Food Processing System Analysis and Evaluation (3) Design and evaluation of food processing operations to produce safe and acceptable quality food product. Prereq: Food Chemistry, Food Microbiology, Food Preservation or consent of instructor. Sp

500 Thesis (1-15) PrN only. E

501 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Maximum 3 hrs. F,Sp

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

503 Problems in Lieu of Thesis (2-3) May be repeated. S/NC only. E

507 Professional Development Seminar (1) (Same as Agriculture 507, Animal Science 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507) PrN only. F

509 Scientific Communication (1) (Same as Agriculture 509, Animal Science 509, Ornamental Horticulture and Landscape Design 509, and Plant and Soil Sciences 509) PrN only. F

510 Instrumental Analysis of Foods (3) Modern instrumental methods for control of food manufacturing processes. Prereq: Food Chemistry. 2 hrs and 1 lab. F

511 Color of Foods (2) Chemical basis, measurements, and reactions involved in color changes in foods. Manufacture and application of materials used to modify color of foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F, A

512 Flavor of Foods (2) Chemical basis, measurements, and reactions involved in flavor changes in foods. Manufacture and application of flavorings in foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F, A

515 Food Carbohydrates, Proteins and Lipids (4) Advanced study of chemical and physical attributes of carbohydrate, protein, and lipid components of foods; effects of components on production of safe and consistent quality food products; and changes during processing and/or distribution of food products. Prereq: Food Chemistry or equivalent. 3 hrs and 1 lab. Sp

520 Food and Industrial Fermentations (3) Microbiology, biochemistry and technology of food-related fermentations involving dairy products, meat, cereals, fruits and vegetables. Production of food ingredients and by-product utilization. Prereq: Food Microbiology and Lab, Food Preservation, Biochemistry and Cellular and Molecular Biology. 4 hrs or equivalent. 2 hrs and 1 lab. Sp

521 Advanced Food Microbiology (3) Introduction to the understanding of microorganisms and their relation to spoilage, fermentation and food safety. Prereq: Food Chemistry or equivalent. 2 hrs and 1 lab. Sp

540 Food Product Development (3) Art, science and technology of developing and marketing new food products. Prereq: Food Preservation. 2 hrs and 1 lab. Sp

560 Advanced Meat Science (3) Physical and chemical changes that occur in the conversion of muscle to meat; effect of postmortem treatments on meat quality, composition and palatability. Prereq: Meat Science. 2 hrs and 1 lab. Sp

566 Food Oils and Fats (2) Chemistry and technology of food oils/fats processing and use: oils from oilseeds. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. Sp

570 Special Topics in Food Technology and Science (1-3) Critical reviews of current research and production in the food industry. May be repeated. Minimum 6 hrs. F, Sp

590 Directed Studies (1-3) Research on non-thesis topics chosen by student and major professor. Supervised experience in food industry or governmental laboratories. May be repeated. Maximum 6 hrs. E

600 Doctoral Research and Dissertation (3-15) PrN only. E

601 Seminar (1) Reports and directed discussion on research topics from current literature. May be repeated. Maximum 3 hrs. F, Sp

620 Food Toxicology (2) Basic and applied concepts in food toxicology; toxicological aspects of processed foods. Mode of action, prevention and control of food toxicants in food supply. Prereq: Food Chemistry, 510, or consent of instructor. Sp

640 Advanced Food Processing (3) Role of processing treatments in modification of food properties; texture, flavor and color changes. Prereq: Food Preservation, 510, 511, 512 or consent of instructor. Sp

670 Food Crop Products (3) Food products from plant types, manufacturing systems, quality attributes and utility. Prereq: Food Preservation and 3 hrs biological science or consent of instructor. 2 hrs and 1 lab. Sp

680 Food Oils and Fats (2) Chemistry and technology of food oils/fats processing and use: oils from oilseeds. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. Sp

690 Special Topics in Food Technology and Science (1-3) Critical reviews of current research and production in the food industry. May be repeated. Minimum 6 hrs. F, Sp

700 Thesis (1-15) PrN only. E

701 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Maximum 3 hrs. F, Sp

750 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

753 Problems in Lieu of Thesis (2-3) May be repeated. S/NC only. E

757 Professional Development Seminar (1) (Same as Agriculture 507, Animal Science 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507) PrN only. F

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**Forestry, Wildlife and Fisheries**

(College of Agricultural Sciences and Natural Resources)

**MAJORS**

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

**Georges M. Hopper, Head**

**Professors:**
Barrett, J. W. (Emeritus), Ph.D. .......... Syracuse
Busscher, E. R. (Emeritus, Distinguished Prof.), Ph.D. .......... NC State
Core, H. A. (Emeritus), Ph.D. .......... Syracuse
Daedens, B. L., Ph.D. .......... Colorado State
Dimnick, R. W. (Emeritus), Ph.D. .......... Wyoming
Hill, T. K., Ph.D. .......... Auburn
Hopper, G. M., Ph.D. .......... VPI
Osemier, D. M., Ph.D. .......... Syracuse
Pelton, R. M., Ph.D. .......... Georgia
Rogers, J. C., Ph.D. .......... NC State
Schneider, G. F., Ph.D. .......... Michigan State
Sharp, J. B. (Emeritus), D.P.A. .......... Harvard
Strange, R. J. ( Liaison), Ph.D. .......... State
Stumbo, D. A. (Emeritus), Ph.D. .......... Minnesota
Thor, E. (Emeritus), Ph.D. .......... NC State
Wilson, J. L., Ph.D. .......... Tennessee
Winstinor, P. M., Ph.D. .......... Iowa State

**Associate Professors:**
Buehler, D. A., Ph.D. .......... VPI
Fly, J. M., Ph.D. .......... Michigan
Hay, R. L., Ph.D. .......... Duke
Scharbaum, S. E. (Liaison), Ph.D. .......... Colorado State

**Assistant Professors:**
Bond, B. H., Ph.D. .......... VPI
Clatterbuck, W. K., Ph.D. .......... Mississippi State
Harper, C. A., Ph.D. .......... Clemson
Young, T. M., M.S. .......... Tennessee

**Graduate study leading to the Master of Science with majors in Forestry and in Wildlife and Fisheries Science is offered by the Department of Forestry, Wildlife and Fisheries.**

The Master of Business Administration, with a concentration in forest industries management, is available for qualified students. This degree program is offered by the College of Business Administration with participation by the Department of Forestry, Wildlife and Fisheries. The Doctor of Philosophy can be achieved through the University's Department of Ecology and Evolutionary Biology. The mission of the Department of Forestry, Wildlife and Fisheries is to advance the science, management, utilization, and appreciation of natural resources in Tennessee, the region and beyond through programs in teaching, research and extension.

**THE MASTER'S PROGRAMS**

Both thesis and non-thesis options are available for the major in Forestry; a thesis is required in Wildlife and Fisheries Science. For admission, the student must have a Bachelor's degree from an accredited institution in agriculture.
forestry, wildlife, fisheries, or other natural resource area. Applicants must take the general Graduate Record Examination (GRE) with minimum scores required. Graduate School ratings forms or letters of recommendation from three individuals familiar with the applicant's academic ability are required. The department also has an application that must be submitted at the time of application to The Graduate School.

**Thesis Option**

1. Prior to research for the thesis, the student is required to develop a written research proposal. Registration for 6 hours of Thesis (Forestry 500 or Wildlife and Fisheries Science 500) is required.
2. A graduate committee of no fewer than 3 faculty members must be selected by the second semester of residence. At least one member shall be from outside the department. In addition to the thesis requirement, a minimum of 24 hours of graduate coursework is required. This work must be approved by the student's committee and no more than 10 hours of the minimum 30 can be below the 500 level. The committee may require additional coursework if the student's progress or background indicates such need.
3. All students are required to include Forestry 512 or Wildlife and Fisheries Science 512, Seminar, in their programs. This is required of each graduate student in residence fall semester.
4. An oral examination covering the thesis and coursework is required.

**Non-Thesis Option (Forestry only)**

1. Thirty-five hours of graduate coursework of which 23 must be at the 500 level or above is required.
2. A graduate committee of no fewer than 3 faculty members will be selected. At least one member shall be from outside the department. The committee will meet and schedule the student's program during the first semester in residence.
3. Three hours of Forestry 511 are required.
4. Nine hours of coursework in the department must be at the 500 level or above, exclusive of Forestry 511.
5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 28 hours of approved study.

**MINOR IN ENVIRONMENTAL POLICY**

The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.
Grading and Records.

Academic Common Market

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Geography is available to residents of the states of Alabama, Arkansas, Mississippi, Virginia, or West Virginia. The master’s program is also available to residents of Texas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Graduate Courses

410 Global Positioning Systems and Geographic Data (3) Theory, field and laboratory use of Global Positioning Systems for capturing geographic data; coordinate systems; datum issues, scanning and digitizing, map standards, and uncertainty in Geographic Information Systems, 2 hrs and 1-2 hr lab.

422 Fisheries Techniques (2) Active and passive sampling techniques for fish and aquatic organisms; population estimation methods; fish handling and transport; field and laboratory data analysis; interpreting tagging techniques; age determination and incremental growth analysis; stream assessment, equipment selection, and stocking. Prereq: Principles of Fisheries and Wildlife Management or consent of instructor. 1 hr and 1 lab or field. F

433 Fisheries Science (3) Quantification and management of freshwater fish populations, estimation, age growth, biological assessment, and stocking. Prereq: Principles of Fisheries and Wildlife Management or consent of instructor. 2 hrs and 1 lab. Sp

444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of game mammals and endangered mammals. Current principles and practices of wild mammal management. Prereq: Principles of Ecology and Management of Wildbirds or consent of instructor. 2 hrs and 1 lab. Sp

445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of game birds, endangered birds, and bird pests. Current principles and practices of wild bird management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

490 Ethics in Wildlife and Fisheries Management (1) Ethical bases for decision-making and application of ethical methodologies in practice of wildlife and fisheries management. Seminars by ethicists, wildlife and fisheries scientists, and managers on how to deal with students with diverse perspectives of ethical behavior in practice of wildlife and fisheries management. Lectures, panel discussions, and case studies. Team taught. Prereq: Senior standing. Sp

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

501 Planning and Administration of Fisheries and Wildlife Programs (2) Factors influencing policy and program planning activities of fisheries and wildlife agencies. Decision-making policies, case histories. Prereq: Graduate standing or consent of instructor. Sp

504 and 3 semester hours at the 600 level. In accordance with specific interests and needs, the program must include 504, 515, 599, 9 hours of 600-level seminars, and (at each offering during residency) 501. A minimum of 9 hours must be earned in related fields outside the department. Competence in cartography and quantitative techniques is required. Additional tools, including languages, will be required as appropriate to the student’s areas of research specialization.

Examinations required for admission to candidacy include a written comprehensive examination, comprised of two written examinations in which the student will be tested on his/her knowledge of two special fields, and related areas of geography; an oral examination on the student’s program, the special fields and related areas, and the dissertation proposal. All parts of the written comprehensive examination should be taken within the same semester.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop a minor in an interdisciplinary specialization in environmental policy. See Economics for program description.

French

See Modern Foreign Languages and Literatures

Geography

(Major of Arts and Sciences)

MAJOR

DEGREES

Geography ......................... M.S., Ph.D.

Carol Harden, Head

Professors:


Associate Professors:

Brinkman, Leonard W., Jr., Ph.D. .... Wisconsin Harden, Carol P., Ph.D. ......... Colorado Horn, Sally P., Ph.D. ............ California Rehder, John B., Ph.D. ......... Louisiana State Shaw, Shi-Lung, Ph.D. ......... Ohio State

Assistant Professor:

Orvis, Kenneth H., Ph.D. ............ California

The department offers the Master of Science and Doctor of Philosophy degrees. The master’s degree emphasizes development of professional competence as a geographer and offers opportunities to gain substantial depth in a concentration or a major technique. An emphasis in geographic information systems is available for students who have appropriate backgrounds in mathematics and computer science. The doctoral program is for those who have demonstrated proficiency in conducting independent research. The department is particularly well-equipped to direct graduate work in location analysis, transportation geography, urban and rural geography, cultural ecology, and the geography of the natural environment (especially biogeography and geomorphology). The faculty is qualified to direct students from a variety of approaches ranging from historical and humanistic to rigorously analytic and GIS-based.

The Master’s Program

THE DOCTORAL PROGRAM

The department offers the thesis and non-thesis options for the Master of Science. Both options require a minimum of 30 semester hours beyond the completion of a sound graduate major program. At least two-thirds of the total hours in the degree outside must be at or above the 500 level and must include 501 (at each offering during residency). 504 and 3 semester hours at the 600 level. In the thesis option, 6 hours must be Thesis 550. A final examination is required in both programs.

THE DOCTORAL PROGRAM

The department offers a research degree and is granted only to those who demonstrate proficiency in conducting independent research. Students must have a broad foundation and understanding of the discipline; these should have been achieved in a comprehensive master’s program. Course requirements for the degree shall be determined by the student’s faculty committee in accordance with specific interests and needs. The program must include 504, 516, 509, 9 hours of 600-level seminars, and (at each offering during residency) 501. A minimum of 9 hours must be earned in related fields outside the department. Competence in cartography and quantitative techniques is required. Additional tools, including languages, will be required as appropriate to the student’s areas of research specialization.

Examinations required for admission to candidacy include a written comprehensive examination, comprised of two written examinations in which the student will be tested on his/her knowledge of two special fields, and related areas of geography; an oral examination on the student’s program, the special fields and related areas, and the dissertation proposal. All parts of the written comprehensive examination should be taken within the same semester.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop a minor in an interdisciplinary specialization in environmental policy. See Economics for program description.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Geography is available to residents of the states of Alabama, Arkansas, Mississippi, Virginia, or West Virginia. The master’s program is also available to residents of Texas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Graduate Courses

410 Global Positioning Systems and Geographic Data (3) Theory, field and laboratory use of Global Positioning Systems for capturing geographic data; management of geographic data; coordinate systems; datum issues, scanning and digitizing, map standards, and uncertainty in Geographic Information Systems, 2 hrs and 1-2 hr lab.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Description</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>411</td>
<td>Computer Mapping and Geographic Information Systems</td>
<td>Concepts, management, and presentation of geographic data for research, cartographic data structures, prerequisite: Introduction to Cartography and knowledge of computer language or consent of instructor.</td>
<td>2 hrs and 1.2 hr lab</td>
</tr>
<tr>
<td>412</td>
<td>Advanced Cartographic Techniques</td>
<td>Cartographic design and data display for thematic and thematic maps. Basic principles and methods of reproduction, prerequisite: Introduction to Cartography or consent of instructor.</td>
<td>2 and 2 hrs</td>
</tr>
<tr>
<td>413</td>
<td>Remote Sensing: Types and Applications</td>
<td>Principles and uses of remote imagery, electromagnetic, and spectral data: geographic interpretation and mapping techniques. Prerequisite: Introduction to Cartography or consent of instructor.</td>
<td></td>
</tr>
<tr>
<td>415</td>
<td>Quantitative Methods in Geography</td>
<td>Application of statistical techniques, point pattern analysis, and analysis of areal units. Prerequisite: Statistical Reasoning or two semesters of calculus or consent of instructor.</td>
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</tr>
<tr>
<td>421</td>
<td>Geography of Folk Societies</td>
<td>Study of the geographical aspects of popular culture, traditional material culture, and rural settlement, examples from eastern North America and selected foreign areas. Prerequisite: World Geography or Cultural Geography: Core Concepts or consent of instructor.</td>
<td></td>
</tr>
<tr>
<td>423</td>
<td>Geography of American Popular Culture</td>
<td>Study of regional variation in popular cultures, youth cultures in United States. Prerequisite: Cultural Geography: Core Concepts or consent of instructor. (Same as American Studies 423.)</td>
<td></td>
</tr>
<tr>
<td>429</td>
<td>Plant Geography of North America</td>
<td>Characteristics and distribution of major plant communities of Canada, the U.S., Mexico, and Central America. Relationships to climate, soil, fire, and human disturbance. Long-term history and future prospects. Prerequisite: Coursework in geography or botany or consent of instructor.</td>
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<tr>
<td>433</td>
<td>The Land-Surface System</td>
<td>Characteristics of surface form, water, vegetation, and surface materials, and their regional interrelationships. Prerequisite: Geography of the Natural Environment or consent of instructor.</td>
<td></td>
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<tr>
<td>434</td>
<td>Climatology</td>
<td>Changing distribution patterns of plants and animals on earth.</td>
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<tr>
<td>435</td>
<td>Biogeography</td>
<td>Changing distribution patterns of plants and animals on earth.</td>
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<tr>
<td>436</td>
<td>Water Resources</td>
<td>Global water resources and hydrologic processes: water availability, flooding, and water quality issues. Prerequisite: Physical and Economic Geographical Perspectives. Prerequisite: Geography of the Natural Environment or consent of instructor.</td>
<td></td>
</tr>
<tr>
<td>437</td>
<td>Plant Geography of North America</td>
<td>Characteristics and distribution of major plant communities of Canada, the U.S., Mexico, and Central America. Relationships to climate, soil, fire, and human disturbance. Long-term history and future prospects. Prerequisite: Coursework in geography or botany or consent of instructor.</td>
<td></td>
</tr>
<tr>
<td>446</td>
<td>Geography of Resource</td>
<td>Study of factors related to variations in resource availability from time to time and place to place: economic and metallic resources. Prerequisite: World Geography or Economic Geography: Core Concepts or consent of instructor.</td>
<td></td>
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<tr>
<td>448</td>
<td>Geography of Transportation</td>
<td>Examination of transportation systems, their effects on trade patterns, land use, location problems, and development. Prerequisite: Economic Geography: Core Concepts or consent of instructor.</td>
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<tr>
<td>450</td>
<td>Process Geomorphology</td>
<td>Same as Geology 450.</td>
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<tr>
<td>466</td>
<td>Teaching and Learning Geography</td>
<td>Preparation of prospective teachers in content, skills, strategies, and understandings needed for effective teaching and assessment of geography in K-12 schools. Course organization and support based largely on that of National Geography Standards.</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>Thesis (1-15)</td>
<td>Prerequisite: E. 451 Colloquium in Geography</td>
<td>Discussion of departmental research, current research literature, and general topics. Registration required of resident graduate students, may be repeated, maximum 4 hours. May be applied toward graduate degree. S/NC only.</td>
</tr>
<tr>
<td>501</td>
<td>Colloquium in Geography</td>
<td>Discussion of departmental research, current research literature, and general topics. Registration required of resident graduate students, may be repeated, maximum 4 hours. May be applied toward graduate degree. S/NC only.</td>
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<tr>
<td>504</td>
<td>Introduction to Geographical Research</td>
<td>Research interests and methods of departmental faculty. Research frontiers in geography. Required of new graduate students.</td>
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<tr>
<td>505</td>
<td>Directed Research</td>
<td>Research on problems as defined by individual students. Prerequisite: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/NC or letter grade.</td>
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<tr>
<td>506</td>
<td>Directed Readings</td>
<td>Readings on topics of interest as defined by individual students. Prerequisite: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/NC or letter grade.</td>
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<tr>
<td>517</td>
<td>Geographic Information Management and Processing</td>
<td>Concepts and methods in management of geographic information. Databasedesign, manipulation, sampling and analysis. Prerequisite: Consent of instructor.</td>
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<tr>
<td>541</td>
<td>Topics in Urban Geography</td>
<td>Examination of trends, problems, and methods in urban geography and transportation networks. Prerequisite: 449 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.</td>
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<tr>
<td>550</td>
<td>Regional Geomorphology</td>
<td>Same as Geology 550.</td>
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<tr>
<td>577</td>
<td>Biological Conservation</td>
<td>Analytical treatment of politics, policies, and forms of biological conservation as practiced in U.S. and abroad. Prerequisite: Consent of instructor.</td>
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<tr>
<td>600</td>
<td>Seminar in Geography</td>
<td>Topics vary. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>631</td>
<td>Seminar in Natural Hazards</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>632</td>
<td>Seminar in Physical Geography</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>634</td>
<td>Seminar in Climatology</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>651</td>
<td>Seminar in Urban Geography</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>653</td>
<td>Seminar in Geography</td>
<td>Topics vary. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>656</td>
<td>Seminar in Biogeography</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>657</td>
<td>Seminar in Geography</td>
<td>Topics vary. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>659</td>
<td>Seminar in Geography</td>
<td>Topics vary. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>661</td>
<td>Seminar in Urban Geography</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>663</td>
<td>Seminar in Geography</td>
<td>Topics vary. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>665</td>
<td>Biological Conservation</td>
<td>Analytical treatment of politics, policies, and forms of biological conservation as practiced in U.S. and abroad. Prerequisite: Consent of instructor.</td>
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<tr>
<td>674</td>
<td>Seminar in Geography of Latin America</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>679</td>
<td>Seminar in Biological Conservation</td>
<td>Conduct of original research. Prerequisite: 577 or consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>682</td>
<td>Seminar in Geography of the American South</td>
<td>Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>689</td>
<td>Seminar in Geography</td>
<td>Topics vary. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>693</td>
<td>Seminar in Biological Conservation</td>
<td>Conduct of original research. Prerequisite: 577 or consent of instructor. May be repeated. Maximum 6 hrs.</td>
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</tbody>
</table>

### Geological Sciences

**College of Arts and Sciences**

**MAJOR**

**DEGREES**

- **Geology**
  - M.S., Ph.D.

**Professors:**

- Broadhead, D. S., Ph.D. (Iowa)
- Dries, Steven G. (Liaison), Ph.D. (Wisconsin)
- Dunne, William M., Ph.D. (Bristol)
Hatcher, Robert D., Jr. (Distinguished Scientist), Ph.D. ............. Tennessee
Kopp, Otto C., Ph.D. ................................ Columbia
Labotka, Theodore C., Ph.D. ................................ Caleche
McLaughlin, Robert E. (Emeritus), Ph.D. ......................... Pennsylvania
Missa, Kula C., Ph.D. ........................................... Harvard
McSweeney, Harry Y., Ph.D. ................................ Western Ontario
Taylor, Lawrence A., Ph.D. .................................... Lehigh
Walker, Kenneth R. (Carden Prof.), Ph.D. ......................... Yale

The Department of Geological Sciences offers both the M.S. and Ph.D. degrees in Geology. Persons interested in these programs should contact the Director of Graduate Admissions in the department.

For admission, an applicant must provide transcripts of previous university work, two rating forms or letters of recommendation, and GRE scores (general). Students are not normally admitted under non-degree status.

The comprehensive examination includes both written and oral parts in which the candidate will be tested on his/her knowledge of the area concerning the proposed dissertation and of related fields. The candidate is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework beyond the master's degree is required in addition to the 24 hours of Dissertation 600. The coursework includes the sum of 9 hours of 600-level geology courses, 9 hours of 500-level or higher geology courses, and 6 hours of additional graduate courses. Extra-departmental coursework is allowed.

The student must demonstrate a reading knowledge of a foreign language in which there is a body of geologic literature, as approved by the student's dissertation committee. The foreign language requirement may be waived for Ph.D. students whose native language is not English and who have demonstrated proficiency in English. Substitutions may also be allowed.

THE MASTER'S PROGRAM

The department offers the thesis option in the master's program. Graduation requires successful oral defense of a written thesis and a minimum 3.0 GPA in all graduate coursework.

Course requirements are a minimum of 30 semester hours, including:
1. Six hours of Thesis 500.
2. Registration in 595 during the first two years in residence. Two hours may be counted toward the 30-hour minimum. This requirement may be waived in unusual circumstances.
3. Sixteen hours of geology courses, with at least 14 hours at the 500 or 600 level, including at least one course from any of the following five groups:
   - Group 1: 410, 460, 480, 530, 565, 585
   - Group 2: 420, 520, 525, 545, 546
   - Group 3: 470, 570, 571, 575, 578
   - Group 4: 401, 485, 510, 521, 535, 550, 561
   - Group 5: Any 400- or 500-level courses with graduate credit from related departments (allied sciences, mathematics, and engineering), selected with approval of advisor.
4. Eight hours of additional graduate coursework.

THE DOCTORAL PROGRAM

The prerequisite for the Ph.D. program, in addition to that for the M.S. program, is either a master's degree in Geology, or a Bachelor's degree plus completion of 9 hours of coursework from the list in #3, above, including one course from each group. These courses may be taken while completing other course requirements.

Graduation requires passing a comprehensive examination, taken no later than the end of the second year, and completion of all course requirements with a minimum 3.0 GPA, completion of the language requirement, and successful oral defense of the dissertation. The comprehensive examination includes both written and oral parts in which the candidate will be tested on his/her knowledge of the area concerning the proposed dissertation and of related fields. The candidate is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework beyond the master's degree is required in addition to the 24 hours of Dissertation 600. The coursework includes the sum of 9 hours of 600-level geology courses, 9 hours of 500-level or higher geology courses, and 6 hours of additional graduate courses. Extra-departmental coursework is allowed.

The student must demonstrate a reading knowledge of a foreign language in which there is a body of geologic literature, as approved by the student's dissertation committee. The foreign language requirement may be waived for Ph.D. students whose native language is not English and who have demonstrated mastery of the English language, as determined by the student's dissertation committee.

GRADUATE COURSES

401 Quantitative Methods in Geology (3) Applications of calculus and differential equations to problems in earth sciences. Examples of diffusion equation in hydrogeology, wave equation in geophysics, mechanical modeling and boundary conditions in structural geology and tectonics. Prereq: The Dynamic Earth or Earth, Life, and Time, 2 semesters of Calculus.


411 Optical Mineralogy (2) Laboratory course on principles of optical microscopy. Use of petrographic microscope to identify rock-forming minerals with applications to petrology and environmental mineralogy. Prereq: Mineralogy.

412 Elements of X-ray Diffraction (2) Laboratory course on principles and applications of X-ray diffraction, Phase identification, quantitative determination of mineral abundance mixtures, and crystal structure determination. Prereq: Mineralogy.

420 Paleocology (4) Principles of ecological analysis as applied to fossils and fossil assemblages; data collection and interpretation. Laboratory designed around preparation of scientific reports based on field and laboratory analysis. Writing emphasis course. 3 hrs and 1 lab.

421 Invertebrate Paleontology (4) Survey of invertebrate animal phyla: skeletal structure and preservation, functional morphology, ecology, and stratigraphic distribution. Prereq: Paleobiology or consent of instructor. 2 hrs and 2 1/2 hrs.

440 Field Geology (5) Summer field course for advanced undergraduate geology majors and first-year graduate students in geology. Taught off-campus and requires full time of student. Subject to the supervision of major aspects of geological sciences in societal context. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Prereq: Completion of major core courses and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface, earth systems, upon case histories, maps, remote sensing imagery. Prereq: 101-09. (Same as Geography 450) 2 hrs and 1 1/2 lab.

455 Basic Environmental Geology (3) Applications of geological sciences toward comprehension of effects of geological processes on living systems and the impact on human activities on earth’s environment. Prereq: The Dynamic Earth. 2 hrs and 1-3 hr lab or field period.

460 Principles of Geochemistry (3) Application of chemical principles to geologic problems. Crystal chemistry and relation between atomic structure and distribution and behavior of elements in earth’s crust. Prereq: Chemistry 120-30, Recommend pre: 330. 2 hrs and 1 lab.


471 Fieldwork in Geophysics (2) Geophysical investigations applied to solution of problems in tectonics, hydrogeology, or environment. Summer field course off-campus. Requires full time for 2 or more weeks. Prereq: 470 or consent of instructor.

475 Physical and Chemical Systems of the Earth (3) Development of physical Earth and solar nebula to present. Formation, composition, and evolution of earth and solar system. Neptunian, pluto, and barnet, and core. Interdependence of Earth, atmosphere, and hydrosphere, and earth’s surface. Historical perspective on major controversies of Earth and problems of our planet. Prereq: 16 hrs of geology courses numbered 300 and above. 2 hrs and 1 discussion.

480 Principles of Economic Geology (3) Ore-forming processes, classification of mineral deposits, survey of different types of mineral deposits with examples, and metallogenesis. Prereq: 310 and 330 or equivalents. Recommended pre: 460. 1 hr and 1-2 lab.

485 Principles of Hydrogeology (3) Physical principles of flow, hydrodynamic, and convective systems, hydrostatic equilibrium, and water well design. Introduction to transport processes. Prereq: The Dynamic Earth; Calculus; Fundamentals of Physics or equivalent. Consent of instructor (Same as Civil Engineering 485).

496 Hydrogeology Laboratory (1) Application and demonstration of hydrogeological principles in field and laboratory. Prereq: or coreq: 485 or Environmental Engineering 536 or consent of instructor.

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

502 Registration for Use of Facilities (2-15) Required for the student not otherwise registered during any semester when classes are not being offered. Requires full time before degree is completed. May be used toward degree requirements. May be repeated. S/N/C only. E

505 Structure of the Southern and Central Appalachians (2) Structural development of Southern and Central Appalachians from extracrustal Late Proterozoic-earliest Paleozoic rift-drift-platform margin through processes related to compressional events producing accretionary wedge elements that formed Appalachian orogeny within the Paleozoic. Comparisons to similar orogens. Prereq: Structural Geology.

510 Clay Mineralogy (3) Origin, chemistry, structure, and properties of clay minerals; application of mineralogical techniques in clay mineralogy. Prereq: 310 and 598 or equivalent. 2 hrs and 1 lab.

521 Data Analysis in Geology and Environmental Science (3) Application of statistical and other quantitative techniques using computers to analyze geological data: environmental problems.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and subsolidus processes and physical conditions. Laboratory involves petrographic study of thin section of crystalline rocks. Prereq: 410. 3 hrs and 1 lab.

535 Ground Water Hydrology (3) (Same as Environmental Engineering 535.)

540 Seminar in Local Geology (1) Introduction of geology of Southern Appalachians. 1 hr plus fieldtrips.
545 Sandstone Petrology/Physical Sedimentology (4) Field and microscopic study of sandstone, conglomerate, and related rocks; associated processes. Prereq: 541 or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonates; sediments and diagenesis of carbonate rocks; tectonic setting of deposition. Prereq: 541 or equivalent. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Geomorphological processes, analysis of landforms, and sedimentary processes in modern and ancient environments. Prereq: 370 or equivalent. 3 hrs and 1 lab.

553 Stable Isotope Geochemistry (3) Stable isotope methods in geology and biology; fractionation and application to geologic problems. Prereq: 260 or consent of instructor. 3 hrs and 1 lab.

556 Chemical Petrology (3) Petrological study of igneous, metamorphic, and sedimentary rocks; structure and composition of minerals. Prereq: 260 or equivalent. 3 hrs and 1 lab.

557 Heat Transfer and Fluid Mechanics (3) Heat transfer and fluid mechanics as applied to geotechnical engineering problems. Prereq: 260 or equivalent. 3 hrs and 1 lab.

563 Mineral Physics (3) Physical properties and crystal chemistry of minerals; phase relations in metamorphic and igneous processes. Prereq: 260 or equivalent. 3 hrs and 1 lab.

565 Thermodynamics of Geochemical Systems (3) Thermodynamics of geologic materials; applications to geologic processes. Prereq: Chemistry 102-30. 3 hrs and 1 lab.

566 Geochemical Analytical Methods (3) Analytical methods for geochemical analysis; applications to geologic problems. Prereq: 260 or equivalent. 3 hrs and 1 lab.

570 Advanced Structural Geology (4) Current topics in structural geology and tectonics; recent literature. Prereq: 370 or equivalent. 3 hrs and 1 lab.

572 Fracture Analysis (3) Field and subsurface characterization of fractures; mechanical development of natural fractures; role in groundwater flow. Prereq: Structural Geology or consent of instructor. 3 hrs and 1 lab.

573 Sedimentary Petrology (3) Sedimentary rocks; processes of sedimentation; diagenetic processes. Prereq: 260 or equivalent. 3 hrs and 1 lab.

574 Sedimentary Geology (3) Sedimentary environments, modern and ancient; processes of sedimentation, diagenesis, and paleoenvironments. Prereq: 260 or equivalent. 3 hrs and 1 lab.

575 Tectonics (4) Evolution of Earth's lithosphere in context of plate tectonics theory; formation of continents through comparative anatomy of mountain belts, including Appalachian, Alps, Urals, Cordilleras, Andes, and Himalayas. Prereq: Structural Geology or consent of instructor. 3 hrs and 1 seminar.

576 Reflection Seismology (3) Imaging subsurface features using reflected seismic waves. Prereq: 470 or consent of instructor. 3 hrs and 1 lab.

577 Terrestrial Geomorphology (3) Study of landforms and processes; environmental and socioeconomic implications. Prereq: 370 or equivalent. 3 hrs and 1 lab.

578 Continental Geology (3) Geology of continental environments; processes of erosion, deposition, and modification. Prereq: 260 or equivalent. 3 hrs and 1 lab.

583 Geomorphology (3) Geomorphological processes and landform evolution; applications to geologic problems. Prereq: 260 or equivalent. 3 hrs and 1 lab.

585 Contaminant Hydrogeology (3) Physical transport processes, subsurface flow, groundwater age dating, and contamination of groundwater. Prereq: 470 or equivalent. 3 hrs and 1 lab.

586 Field and Laboratory Methods in Hydrogeology (3) Research methods: Measurement of hydraulic properties, sampling, and instrumentation; tracer experiments. Formulating hypotheses and research plans. Prereq or coreq: 485 or Environmental Engineering 655; consent of instructor.

590 Special Problems in Geology (1-3) Directed study or special topics. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

595 Selected Topics in Geology (1) Presentation of research by faculty and visiting scientists. Registration required each semester for resident full-time graduate students, except in summer and when registered for 596. S/NC only.

596 Geology Colloquium (1) Preparation and oral presentation of scientific material. Grade based on content, preparation, presentation, and instructor critique in departmental seminar. Taken only once during residence for each graduate student.

600 Doctoral Research and Dissertation (2-15) P/NP only.

600 Seminar in Palentology (3) May be repeated with consent of department. Maximum 9 hrs.

640 Seminar in Sedimentary Geology (3) May be repeated with consent of department. Maximum 9 hrs.

650 Seminar in Geomorphology and Quaternary Geology (3) May be repeated with consent of department. Maximum 9 hrs.

660 Seminar in Geochemistry (3) May be repeated with consent of department. Maximum 9 hrs.

670 Seminar in Structural Geology (3) May be repeated with consent of department. Maximum 9 hrs.

675 Seminar in Geophysics (3) Advanced treatment of selected topics in geophysics. Prereq: 470 or consent of instructor.

685 Seminar in Hydrogeology (3) May be repeated with consent of department. Maximum 9 hrs.

German

See Modern Foreign Languages and Literatures

Health and Safety Sciences

(College of Human Ecology)

MAJORS

Health Promotion and Health Education .... M.S. Public Health ..................... M.P.H., M.S.,M.P.H. Safety Education and Service .......... M.S.

Charles B. Hamilton, Head

Professors:

Gorski, June, Dr.P.H. .................. UCLA
Hamilton, Charles B. (Liaison), Dr.P.H. .......................... Oklahoma
Kir, Robert H., Ph.D.............. Indians
Wallace, Bill C. (Liaison), Ed.D.............. Northern Colorado

Associate Professors:
Pursley, R. Jack, Ph.D......................... Iowa
Zemel, Paula, Ph.D......................... Wayne State

Assistant Professors:

Ellison, Jack S. (Liaison), Ed.D........... Tennessee FitzHugh, Eugene C., Ph.D................ Alabama
Smith, Susan M. (Liaison), Ed.D........... Tennessee

The Health and Safety Sciences Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education; and Safety Education and Service; and to the Master of Public Health degree in Public Health. The department provides doctoral preparation through a concentration in Human Ecology. Inquiries should be directed to the department head. Application packets are available by request to department.

The department fosters development of pre-professional and professional competences by those interested in the disciplines of health education/promotion, public health, and safety. The Health and Safety Sciences academic programs emphasize health promotion (lifestyle behaviors) and health protection (regulatory, environmental and safety) strategies for improving individual and community well-being, directly relating to teaching in_UK thematic areas of strength, health and biomedical sciences and children and families. The faculty are committed to the educational value of community-based service learning, applied research, and community outreach. For more information, http://hses.hrsa.gov.

The Department of Health and Safety Sciences

Promotion and Health Education and Safety

The Health and Safety Sciences Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education; and Safety

Health

A graduate program is available leading to the Master of Science with a major in Health Promotion and Health Education (thesis and non-thesis options), requiring completion of 30 semester hours. The program emphasizes research skills development by those already employed in the health professions with each student completing a realistic health-related research proposal as a major developmental activity.

The Doctor of Philosophy with a major in Human Ecology offers a concentration in community health. Perspectives of social, behavioral and biomedical sciences are incorporated with educational models appropriate for addressing community health needs.

THE PH.D. CONCENTRATION

The community health concentration integrates the behavioral and natural sciences with public health, community health education, health promotion and the safety sciences to prepare scholars with an interest in improving the health of the nation.

Requirements include:

1. Minimum 21 hours of foundation courses: 610, 620, 6 hours of statistics, 3 hours of specialized research methods, and 6 hours of natural or behavioral sciences.

2. Minimum 21 hours in primary specialization: 530, 540, 650, 655, 660 and 6 hours of electives.

3. Minimum 12 hours in supporting specialization in a focused area: public health, safety, gerontology or a program approved by doctoral committee.

4. Minimum 6 hours in a cognate area.


GRADUATE COURSES

400 Consumer Health (3) Survey of major consumer health care providers and health care services; selecting, purchasing, evaluating and financing medical and health care services/products. (Same as Public Health 400.) Sp

405 Alcoholism and Alcohol Education (3) Problems of alcoholism; factors which make alcoholism serious health and safety problem. Various types of instructional educational and intervention programs. F
Public Health

Graduate study with a major in Public Health leads to the Master of Public Health (M.P.H.). Three professional preparation concentrations are available: community health education, gerontology, and health planning/administration. For professional practice in improving community health emphasizes a population perspective, service-learning and application opportunities through rigorous internships. The M.P.H. program is accredited by the Council on Education for Public Health. A minor in statistics is available to interested M.P.H. students due to public health affiliation with the Intercollegiate Graduate Statistics Programs.

ADMISSION REQUIREMENTS

A statement of the applicant's educational and career goals and three rating forms are required. Request application packet from the department. Preferential consideration for admission to degree status shall be given to those with a minimum undergraduate grade-point average of 2.8 and with at least one year of professional experience in a health-related occupation. As a restricted program, non-degree admission requires department recommendation. Deadlines for completed applications are 1 February for Summer term and 1 April for Fall semester.

THE MASTER'S PROGRAM

The M.P.H. is a non-thesis program requiring completion of 38 semester hours of coursework including 9 weeks of field practice. The field internship provides a full-time experience with an affiliated health agency or organization offering one or more health programs. Of importance, field practice allows the student to apply academic theories, concepts, and skills in an actual work setting. Programs offered include 9 weeks of field practice in improving community health education, gerontology, and health planning/administration. Field practice in improving community health education, gerontology, and health planning/administration is contingent on consent of major advisor, formal written proposal by the student to the Intercollegiate Graduate Program Committee. Approval must be received before completion of the required coursework.

ADMISSION REQUIREMENTS

Applicants for the M.S.-M.P.H. program must fulfill the following prerequisites:

1. Five years of college coursework including 9 weeks of field practice (or public health internship) is required of all students. Applicable coursework must include 3 credits in Public Health (PH 509), two credits of Seminar in Public Health (NTR 509), two credits of Seminar in Public Health (NTR 509), and 2 credits of Seminar in Public Health (NTR 509). A single block of coursework is required before admission to degree status shall be given to those with a minimum undergraduate grade-point average of 2.8 and with at least one year of professional experience in a health-related occupation. The minimum overall GPA of 3.0 prior to placement in the field. As an alternative to field practice, preparation of a master's essay may be used to fulfill the professional skills development component of the curriculum. Approval must be received from the Public Health Academic Program Committee and is contingent on consent of major advisor, formal written proposal by the student, and completion of an additional research methods course. Written guidelines stipulating expectations and eligibility criteria are available.

Requirements include:
1. Public Health Foundation courses (16 hours): 509, 510, 520, 530, 540, 555.
2. Intership (6 hours): 587, 588.
3. Concentration of Study (16 hours).

Required and recommended electives will be selected by the student in consultation with the major advisor. A list of courses is available for each concentration: community health education, gerontology, and health planning/administration.

DUAL M.S.-M.P.H. PROGRAM

The College of Human Ecology offers a coordinated dual program leading to the conferral of both the Master of Science with a major in Nutrition (public health nutrition concentration) and the Master of Public Health. The dual program allows students to complete both degrees in less time than would be required to earn both degrees independently. The program is designed to meet the needs of students who are interested in the benefits of majors in both nutrition and public health.

Therefore, it accommodates the interests of students who: 1) plan a career in public health nutrition and want to acquire the knowledge and skills of the nutritionist and public health professional; 2) plan a career in nutrition and want to acquire the knowledge and skills of the public health professional; or 3) plan a career in both public health and nutrition.

Admission Requirements

Applications for the M.S.-M.P.H. program must be submitted to the Department of Nutrition for the M.S., Department of Health and Safety Sciences for the M.P.H., and the Public Health Academic Program Committee. Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted provided that dual program studies be started prior to enrollment into the fourth semester of the M.S. and M.P.H. programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the M.S. (public health nutrition concentration) and the M.P.H. degrees, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete approved graduate level courses offered in the Department of Health and Safety Sciences. The Department of Health and Safety Sciences will award a maximum of 11 semester hours of credit toward the M.S. degree and a maximum of 11 semester hours of credit toward the M.P.H. degree for successful completion of approved graduate level courses offered in the Department of Nutrition. All courses for which cross-credit is awarded must be approved by the Public Health Academic Program Committee and the student's graduate committee. A single block field experience (or public health internship) is required of all students and the analytical field paper incorporates public health nutrition and the student's public health concentration.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit towards the M.S. or M.P.H. degree for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit

All courses taken in the dual program must be completed within the 10 semester hours of Field Study in Community Nutrition (NTR 515) and 1 semester hour of Graduate Seminar in Public Health (NTR 509). M.P.H. courses to be counted toward the M.S. include Public Health Administration (PH 520).
Biostatistics (PH 530), and Epidemiology (PH 540).

MINOR IN GERONTOLOGY

Graduate students in Public Health may pursue a specialized minor in gerontology. This interunit/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.P.H. program in Public Health is available to residents of the states of Arkansas or Kentucky. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

COURSE REGISTRATION

Non-degree students must obtain permission from the department head to register for 500-level public health courses. Prerequisite coursework assigned as a condition of admission to the M.P.H. program must be completed promptly, with a grade of B or better, typically within the first semester or two of enrollment in graduate studies.

GRADUATE COURSES

400 Consumer Health (3) (Same as Health 400.)

410 Worksite Health Promotion (3) Foundations of health promotion programs delivered in worksite that revolve around issues relative to employees and management: theory, program design, implementation and evaluation from perspective of health promotion specialist. Prereq: Health Education, Promotion, and Behavior. Sp

403 Directed Independent Study (1-3) Individual in-depth study of selected issues. Prereq: Consent of Instructor. May be repeated. Maximum 6 hrs. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics related to public health. Prereq: Consent of Instructor. May be repeated. Maximum 1 hr. E


511 Fundamentals of Industrial Hygiene (3) Occupational health theory, practice and regulations: recognition, evaluation and control of workplace health hazards. Pertinent workplace problems and situations. Prereq: 2 yrs of chemistry and biology and consent of department. F

520 Public Health Policy and Administration (3) Administrative considerations of public health care programs and public health practice. Health policy formulation, political environment and governmental involvement in health care, environmental health, and managerial concepts (techniques/ processes. F, Su

521 Organization Theory and Health Care Delivery (3) Administrative and Organization theory related to health facilities; operation and management of community hospitals. Case discussions and problem-solving exercises; managerial functions and skills. F

523 Management in Extended Care Settings (3) Managerial concepts and theoretical foundations essential to supervision and administration of health care delivery services. Management and operation of health care programs for patients and clients in settings that provide long-term care, including special psychosocial environmental needs. Programs for home health services, comprehensive medical rehabilitation, nursing homes, congregate living centers and similar type health programs. Prereq: 521 or consent of instructor. Sp

525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health services programs. Fundamentals of budgeting, costing, financing, rate setting, financial reporting and control. Opportunities to apply techniques. Prereq: 520 or consent of instructor. Sp

530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related problems and situations. Emphasizes computer applications, use and interpretation of vital statistics and introductory research methodology preparatory for first course in epidemiology. Prereq: Introductory statistics or consent of instructor. E

540 Principles of Epidemiology (3) Distribution and determinants of health-related outcomes in specified populations, with application to control of health problems. Historical origins of discipline, hypothesis formulation, research design, data and error sources, measures of frequency and association, public health reasoning, disease screening, and injury control. Prereq or consq: 530. F, Sp


550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in variety of educational processes; and introduction to community health analysis. F

552 Community Health Problem Solving (4) Dynamics of community organization, community needs assessment, educational interventions, and application of program planning and evaluation techniques. Opportunity to practice skills in realistic setting. Prereq: 550 or consent of instructor. Sp


560 Theories and Techniques in Health Planning (4) Overview of health planning concepts and methodologies, systems-ordered planning process. Major elements of planning: formulation and conceptualization of problem, plan design, evaluation, implementation, Planning programs of institutions, communities and selected population groups, appropriate diagnoses, and programs for addressing needs. Sp

568 Physical Activity and Positive Health (3) (Same as Exercise Science 568.)

569 Fitness Testing, Programming, and Leadership for Diverse Populations (3) (Same as Exercise Science 569.)

580 Special Topics (3) Prereq: Consent of Instructor. May be repeated under different topic. Maximum 6 hrs.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counseling Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Educational Studies 585, Social Work 585, and Sociology 585.)

587-48-69 Internship (3, 3, 3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prereq: M.P.H. major; one semesterasadviser's note and consent of major advisor; 589, available only for approved extended placements. S/NC only. E

590 Research Methods in Health (3) (Same as Health 590.)

593 Directed Independent Study (1-3) Prereq: Consent of Instructor. May be repeated. Maximum 6 hrs. E

595 Research Seminar (1)

598 Health Aspects of Gerontology (3) (Same as Health 598.)

599 Seminar in Nation's Health (3) (Same as Health 599.)

600 International Health (3) (Same as Health 600.)

Safety

Graduate study with a major in Safety, Education and Service (thesis and non-thesis options) leads to the Master of Science degree. The M.S. requires completion of 30 semester hours. Students may elect an internship experience with private industry or nonprofit organizations. Curricular experiences will assist graduate in preparation for certified safety professional examination.

The graduate program contributes to The University of Tennessee's mission of health protection by preparing safety professionals with the knowledge and skills necessary to create and maintain safer human environments in the workplace (industrial and commercial), home, school, and community. The offering of all core classes on an evening class schedule enables those working full-time in a safety-related field to pursue the M.S. degree with a major in Safety Education and Service on a part-time basis.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Safety Education and Service is available to residents of the states of Alabama, Arkansas, or Florida. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

443 Sports & Recreational Safety (3) Accident prevention and injury control in sports activities; philosophy of sports safety; human environmental factors and interactions in sports injury and control; risk-taking and decision-making strategies; and contributions of sports medicine to safety. 3 hrs and 2 labs. F, Su

452 General Safety (3) Principles, practices, and procedures in general safety. Safety problems in school traffic, recreation, industry, home and other public areas. F, Su

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

531 Behavioral Problems in Safety Education & Accident Prevention (3) Problems of behavior, causes of accidents and application of principles of psychology in development of safe behavior in all segments of environment. F

532 Behavioral Problems in Safety Education & Accident Prevention (3) Problems of behavior, causes of accidents and application of principles of psychology in development of safe behavior in all segments of environment. F

533 Problems and Research in Accident Prevention (3) Safety problems found in wide variety of accidents that occur in community; findings of current research in behavioral sciences as related to variation incidence of accidents. F

534 Organization, Administration and Supervision of Safety Programs (3) National, state and local level programs in a variety of organizations. Implementation of relevant programs. Sp

535 Emergency Management (3) Civil and defense problems: tornadoes, floods, fires, mass civil disasters, and nuclear and personal attack by alien countries. Sp
572 Graduate Workshop in Safety (3) Special safety education problems. For advanced graduate students, teachers, supervisors, and administrators. May be repeated. Maximum 12 hrs.

590 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety/education/management. May be repeated. Maximum 12 hrs.

593 Directed Independent Study (1-3) Individual identification of problem/issue in safety. Extensive reading and critical analysis of safety literature. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs.

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, researched, and reported in acceptable form. May be repeated. Maximum 6 hrs. (Same as Health 601.)

History
(College of Arts and Sciences)

MAJOR DEGREES

History ........................................ M.A., Ph.D.

John R. Finger, Head

Professors:
Bergeron, Paul H., Ph.D. .......... Vanderbilt
Chmielewski, Edward V. (Emeritus), Ph.D. ............... Harvard
Culler, E. Wayne, Ph.D. ............... Texas
Farris, W. Wayne, Ph.D. ............... Harvard
Finger, John R., Ph.D. ............... Washington
Haas, Arthur G., Ph.D. ............... Chicago
Hsu, Yen-Ping (Lindsay Young Prof.), Ph.D. ............... Harvard
Haskins, Raymond J. (Emeritus), Ph.D. ............... California
Klein, Milton M. (Emeritus) (Distinguished Prof.), Ph.D. ............... Columbia
Moser, Harold, Ph.D. ............... Wisconsin
Norrell, R. Jeff (Bernadotte Schmitt Prof.), Ph.D. ............... Wisconsin
Ratner, Lorman A., Ph.D. ............... Cornell
Ulely, Jonathan G. (Emeritus) ......... Illinois
Wheeler, W. Bruce, Ph.D. ............... Virginia

Associate Professors:
Ash, Stephen V., Ph.D. ............... Tennessee
Bing, J. Daniel, Ph.D. ............... Indiana
Bohstedt, John, Ph.D. ............... Harvard
Brummell, Palmar, R., Ph.D. ............... Chicago
Burman, Thomas E., Ph.D. ............... Toronto
Diacon, Todd A., Ph.D. ............... Wisconsin
Higgs, Catherine A., Ph.D. ............... Yale
Johnson, Charles W., Ph.D. ............... Michigan
Muldoway, John, Ph.D. ............... Yale
Pinkney, Paul J., Ph.D. ............... Vanderbilt

Assistant Professors:
Bast, Robert J., Ph.D. ............... Arizona
Bradley, Owen P., Ph.D. ............... Cornell
Glover, Lorri, Ph.D. ............... Kentucky
Liuweichius, Vejas G., Ph.D. ............... Pennsylvania
Pehler, G. Kurt, Ph.D. ............... Rutgers

The Department of History offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. program includes a thesis and non-thesis option. The doctoral program has concentrations in American and European history with special foci in the areas identified under group II doctoral fields and group III teaching fields. Detailed information may be obtained from the Director of Graduate Studies in History who also advises all incoming students.

THE MASTER'S PROGRAM

Admission Requirements

1. Successful completion of a baccalaureate degree from an accredited institution, preferably with a major in history.

2. Acceptable scores on the Graduate Record Examination (general).

General Requirements

Complete 510 and a 600-level research seminar normally during the fall and spring semesters of the first year in the graduate program. Complete 521 in preparation for the M.A. examination. As many as 9 related hours may be taken outside the department. As many as 9 graduate credit hours are applied toward the M.A. degree. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Thesis Option

Twenty-four hours of coursework and 6 hours of Thesis 500 for a total of 30 hours are required. This option requires students to select one M.A. field and write a thesis. At the end of the program the thesis student will stand for a two-hour oral examination on both the thesis and the field.

Non-Thesis Option

A total of 30 hours of coursework is required. At least 6 hours must be completed in each of two M.A. fields. The primary field is examined by a two-hour written follow-up within one week by a one-hour oral examination with the single grade of pass/fail given at the conclusion of the oral examination. No examination is given on the secondary field.

Non-Thesis Option

A total of 30 hours of coursework is required. At least 6 hours must be completed in each of two M.A. fields. The primary field is examined by a two-hour written follow-up within one week by a one-hour oral examination with the single grade of pass/fail given at the conclusion of the oral examination. No examination is given on the secondary field.

M.A. Fields

United States (colonial to present)
Premodern Europe
Modern Europe
Asia

Retention and Termination

A 3.0 overall grade-point average is required to remain in good standing. M.A. students must take the M.A. examination no later than the semester following the completion of 30 hours. A student who fails the-M.A. examination may retake the examination no later than the following semester. A student who fails the examination a second time or does not take the examination when required will be dropped from the program.

THE DOCTORAL PROGRAM

Admission Requirements

1. Successful completion of the M.A. degree from an accredited institution.

2. Acceptable scores on the Graduate Record Examination (general).

Residence and Coursework

Before being admitted to doctoral candidacy, a student must:

1. Complete History 510 at UT Knoxville (may be waived for comparable experience elsewhere).

2. Complete a minimum of 6 related hours outside the department.

3. Spend two consecutive semesters in residence.

4. Complete 9 hours in one Group I doctoral field. There is no minimum hours requirement for a Group II field. Complete 9 hours in one Group III field, including the appropriate 511, 512, or 513 course and two additional courses at the 500 level. The Group III field must be in a different geographic area from the Group II field. Courses taken to fulfill M.A. degrees may be counted toward all field requirements.

5. Fulfill the foreign language requirement.

6. Complete two 600-level research seminars. (One must be completed at UT Knoxville.) Students who have completed a master's thesis need complete only one research seminar (must be taken at UT Knoxville), and History 621.

7. Maintain a 3.0 overall grade-point average in graduate work attempted.

8. Complete 24 hours of graduate coursework (21 hours graded A-F) at UT Knoxville beyond that required for the M.A.

9. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Language Requirements

Students must demonstrate competence in one foreign language through coursework or examination. The student's doctoral committee may specify any other languages or research tools, such as statistics, essential for the student's preparation. The foreign language requirement must be fulfilled before taking the comprehensive examination.

Group III (Teaching Field) Examination

This is a one-hour oral exam which must be completed at any time before the comprehensive examination is taken. A student who fails this, or he or she may retake the exam one time only and must do so the following semester.

Comprehensive Examination

The comprehensive examination is to be taken no later than the semester following the term in which the student has completed the residence, coursework, and language requirements. A student stands examination in one field selected from Group I and one field selected from Group II below. Both parts are 4-hours, written, and taken during the same semester. A general oral exam will be taken following the successful completion of the two written portions. The two written and one oral exam are separate examinations, and Group I must be passed before taking Group II, and the latter passed prior to taking the oral portion. A student who fails any one of the three parts (Group I or Group II or the Oral) which constitute the Comprehensive Exam must repeat the failed exam the following semester, excluding summer. A second failure on any one of the three parts (regardless of which one) will cause the student to be dropped from the History graduate program. Likewise, a student who does not repeat a failed exam within the allotted time (one semester) will be dropped from the program.
Admission to Candidacy
Upon successful completion of the above requirements, a doctoral student may be admitted to candidacy.

Doctoral Fields
Group I:
- Premodern Europe
- Modern Europe
- United States (colonial to present)

Group II:
To be defined by the student's doctoral committee from within one of the following fields:
- United States
- Colonial to Early Republic
- 19th century
- 20th century
- Regional
- Military and Foreign Relations
- Social and Cultural
- American Political
- European
- Medieval
- Early Modern
- Modern
- Political and Diplomatic
- Intellectual and Cultural
- Social and Economic
- National Fields

Group III (Examined Teaching Field):
- World Civilization
- Western Civilization
- U.S. Civilization

Dissertation and Defense
Original research forms the basis for the dissertation. Doctoral candidates must register for a minimum of 3 hours of 600 Dissertation Research each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation in its historical context. The program must be completed within eight years from admission as a potential candidate.

GRADUATE COURSES
415 Western Economic Thought Since the 18th Century (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: classical and neoclassical economics, economics of Keynes and his followers. Principal development of second half of 20th century. Major writing requirement. May not be used toward graduate degree in History. Prereq: Introductory Economics or consent of instructor. (Same as Economics 415.)

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

510 Foundations of Graduate Study in History (3) Assumptions and methods of historians. Required of all candidates for advanced degrees in history. E

511 Teaching World Civilization (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in world civilization.

512 Teaching Western Civilization (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in western civilization.

513 Teaching United States History (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in U.S. history.

521 M.A. Readings (3) Directed readings in preparation for M.A. examinations. Open only to master's candidates in history. May be repeated. Maximum 6 hrs. S/N only.

531 Topics in Premodern Europe (3) Reading seminar: secondary sources on premodern European movements and trends. Focus varies. May be repeated. Maximum 15 hrs.

532 Topics in Modern Europe (3) Reading seminar: secondary sources on movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs.

533 Topics in European National History (3) Reading seminar: secondary sources on international topics, usually British, Russian, German or French. Focus varies. May be repeated. Maximum 15 hrs.

541 Topics in Early American History (3) Reading seminar: secondary sources on early North American history. Focus varies. May be repeated. Maximum 15 hrs.

542 Topics in 19th-Century United States (3) Reading seminar: secondary sources on 19th-century United States. Focus varies. May be repeated. Maximum 15 hrs.

543 Topics in 20th-Century United States (3) Reading seminar: secondary sources on 20th-century U.S. Focus varies. May be repeated. Maximum 15 hrs.

551 Topics in the History of Foreign Relations (3) Reading seminar: secondary sources on foreign relations. Focus varies. May be repeated. Maximum 15 hrs.

552 Topics in Military History (3) Reading seminar: secondary sources on military history; military operations, social impact of war and naval strategy during foreign policy. Focus varies. May be repeated. Maximum 15 hrs.

555 Topics in United States Social and Economic History (3) Reading seminar: secondary sources on U.S. social and economic history. Focus varies. May be repeated. Maximum 15 hrs.

556 Topics in European Social and Economic History (3) Reading seminar: secondary sources on social or economic history of European nations. Focus varies. May be repeated. Maximum 15 hrs.

557 Topics in Cultural and Intellectual History (3) Reading seminar: secondary sources on cultural and intellectual history of Europe. Focus varies. May be repeated. Maximum 15 hrs.

558 Topics in United States Regional and Local History (3) Reading seminar: secondary sources on regions, states and cities of the South. Focus varies. May be repeated. Maximum 15 hrs.

561 Topics in Latin American History (3) Reading seminar: secondary sources in Latin American history. Focus varies. May be repeated. Maximum 15 hrs.

562 Topics in Asian History (3) Reading seminar: secondary sources on Asian history; East Asia and Middle East. Focus varies. May be repeated. Maximum 15 hrs.

570 Topics in History (3) Reading seminar: secondary sources for new topics. Focus varies. May be repeated. Maximum 15 hrs.

585 Topics in World History (3) Reading seminar in transnational themes involving analysis of two or more world cultures. Focus varies. May be repeated. Maximum 9 hrs.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

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

621 Directed Readings (3) Directed readings to prepare candidates for doctoral comprehensive examination. May be repeated. Maximum 1 per doctoral field. S/N only.

632 Seminar in Modern European History (3) Research seminar in primary sources culminating in scholarly paper in modern European history. Focus varies. May be repeated. Maximum 15 hrs.


651 Seminar in Military and Foreign Relations History (3) Research seminar in primary sources culminating in scholarly paper in military or foreign relations history. Focus varies. Not restricted by national grouping. May be repeated. Maximum 15 hrs.


658 Seminar in United States Regional and Local History (3) Research seminar in primary sources culminating in scholarly paper in regional and local history. Focus varies. May be repeated. Maximum 15 hrs.

Holistic Teaching/Learning
(College of Education)

MAJORS
(MA in Education)

DEGREES
Education .......... M.S., Ed.S., Ed.D., Ph.D.

L. Knight, Leader

Professors:
Alexander, J. Estill (Emeritus), Ed.D................. Kentucky

Davis, A. R., Ph.D.............. Ohio State

Hargis, Charles H. (Liaison), Ed.D................. Oklahoma

Huff, P. (Emeritus), Ph.D............. Michigan

Jost, Karl J., Ed.D................. Oklahoma

Knight, Lester N., Ph.D.............. Texas

Rowell, C. Glennon, Ed.D......... George Peabody

Schindler, W. Jean, Ph.D........... Kent State

Turner, T. N., Ed.D.... Penn State

Associate Professors:
Chano, Charles A., Ph.D........ Ohio State

Hannum, Michael C., Ed.D.......... Northern Colorado

Assistant Professors:
Gilrane, Colleen P., Ph.D........... Illinois

Hendricks, D. A., Ph.D.............. Alabama

Instructor:
Butterworth, Jennifer R., Ph.D........ Vanderbilt

The Holistic Teaching/Learning unit participates in graduate programs leading to degrees, majors, and concentrations in Master of Science.

Education
Track 1-elementary education
Track 1-modified and comprehen-sive education
Track 1-reading education
Track 1-social science education
Track 2-elementary teaching
Track 2-modified and comprehen-sive special education
Track 2-secondary teaching
Human Ecology

(College of Human Ecology)

MAJOR

Human Ecology ........................................ Ph.D.

The College of Human Ecology offers the Doctor of Philosophy degrees with a major in Human Ecology.

ADMISSION REQUIREMENTS

A completed file for review includes the Graduate School application file, departmental application, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean’s Office, College of Human Ecology.

THE DOCTORAL PROGRAM

Graduate study leading to the Doctor of Philosophy degree with a major in Human Ecology is available in the Departments of Child and Family Studies; Consumer and Industry Services Management; Health and Safety Sciences; Human Resource Development; Nutrition. Concentration areas are child and family studies, community health, human resource development, nutrition science, textile science, and retail and consumer sciences. A major challenge of the doctoral program in Human Ecology is to draw upon basic research generated from the natural sciences, social sciences, humanities, and the arts, and to provide a holistic perspective that contributes to the improvement of individual and family well-being. Within the College of Human Ecology, research from one discipline is enhanced by encompassing and utilizing the findings of research from other disciplines.

The Ph.D. is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements for the degree are determined by the student’s faculty committee, based upon college and departmental requirements and student needs and interests. The Graduate School sets minimum requirements for the doctoral degree.

More specific information about the course of study is given under the individual academic departments that administer the Ph.D. concentrations.

MINOR IN GERONTOLOGY

An interdepartmental/interdisciplinary minor in gerontology gives the graduate student an opportunity for combining the knowledge and experience about aging in American society with his/her own major concentration.

Core courses and a practicum are offered by the College of Social Work and selected departments within the colleges of Human Ecology, Education, and Arts and Sciences. A cross-listed seminar between contributing programs is designed to integrate experiences from different sources and to demonstrate the multi-faceted nature of working within an aging society.

Declaration of a Minor

Prior to earning more than one-half of the total hours required for this minor, students must complete a “Declaration of a Minor in the College of Human Ecology” form. Copies of this form are available in the Dean’s Office, Room 110, Jesse Harris Building.

Core Experience

Students must complete a core experience of 12 semester hours taken from at least three different departments including nine hours taken from outside the major department. Coursework needs to comply with the following framework:

1. Coursework, 9 hours required. A variety of coursework may be taken toward satisfaction of this requirement. Courses which are offered on a regular basis include: Health 406, 465, Health/Public Health 650, Nutrition 518, Public Health 623, Retail and Consumer Studies 560, Social Work 566, Sociology 413, Psychosocial Studies 504, 522, 525, 528.
2. Applied practicum, 2 hours required.
3. Students should register under practicum experiences in the “Home” department of the supervising faculty.
4. Successful completion of a written comprehensive examination covering subject matter of the minor.

Graduate Committee

At least one faculty member from the Gerontology Policy Committee who is qualified to work with graduate students, must serve on the graduate committees of each student who declares a gerontology minor. Contact Dr. Jim Moran, Associate Dean in Human Ecology, for a current list.

Admission to Candidacy

When application is made for admission to candidacy, indication of the minor must be noted on the Admission to Candidacy form.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Human Ecology is available to residents of Alabama, Kentucky, Mississippi, Tennessee, and Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. P/NP only. E

510 Integrative Nature of Home Economics (3) History and philosophy of home economics. Analysis of current programs and future directions in field. Examination of research, integrative framework. F.A

520 Directed Study in Human Ecology (1-3) Selective topics. Prereq: At least 9 hrs of graduate study in college including courses from at least two departments or consent of instructor. May be repeated. Maximum 9 hrs. E

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

604 Seminar in Curriculum and Instruction-An Interdisciplinary Perspective (1) Required 2 consecutive semesters. S/NC only. E

605 Seminar in Research and Dissertation (1-15) P/NP only. E

606 Seminar in Reading Education (1-15) P/NP only. E

610 Internship in College Teaching and Supervision (3-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

617 Trends and Issues in Curriculum and Instruction-An Interdisciplinary Perspective (3) Current trends and issues in field of curriculum and instruction. Prereq: Admission to Ed.S. program.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in theoretically-based research; public school, institutions, agencies or university settings. Prereq: 9 hrs in statistical and research methods. May be repeated. Maximum 9 hrs. S/NC only.

621 Seminar in Social Studies Research and Theory (2) Status of research and theory. Needed research, related research from other fields, and application of research. Prereq: Recent course in teaching of social studies or consent of instructor. May be repeated. Maximum 4 hrs. E

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioner. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

651 Advanced Studies in Elementary School Language Arts (3) Selected issues in elementary school language arts. Prereq: Graduate course in elementary school language arts or consent of instructor. S

679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

689 Internship (1-15) May be repeated. Maximum 9 hrs. S/NC or letter grade.

693 Independent Study (1-15) May be repeated. S/NC or letter grade.

694 Supervised Reading (1-15) May be repeated. S/NC or letter grade.

695 Special Topics (1-15) May be repeated. S/NC or letter grade.


**Human Resource Development**

(Company of Human Ecology)

**MAJORS**

**DEGREES**

Human Ecology ........................................ Ph.D.
Human Resource Development ..................... M.S.

Gregory C. Petty, Head

Professors:

Campbell, Clifton P., Ed.D. .......... Maryland
Cheek, Gerald D. (Emeritus), Ph.D. ........ Kansas State
Coakley, Carroll J. (Emeritus), Ph.D. .......... Wisconsin
Craig, David G. (Emeritus), Ed.D. ....... Cornell
De Jonge, Jacqueline O., Ph.D. ......... Iowa State
Haskell, Roger W., (Emeritus), Ph.D. ..... Purdue
Pety, Gregory C., Ph.D. ................. Missouri
Wagoner, George A. (Emeritus), M.S. .. Indiana

Associate Professors:

Brewer, Ernest W. (Liaison), Ph.D. ...... Tennessee
Dean, Peter J., II, Ph.D. ............... Iowa
Sillet, Vickie J., Ed.D. ............. Tennessee

Assistant Professor:

Pierce, Randal, Ph.D. ............... Ohio State

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**THE MASTER'S PROGRAM**

The Master of Science degree with a major in Human Resource Development offers two concentrations, each providing opportunities for specialized interests. The training and development concentration is designed to meet the needs of professionals who work in programs encompassing all areas of human resource development. Applicants without an undergraduate degree in an area related to human resource development may be required to take 501 as a prerequisite and to complete an interview part of their program. The master's program is specifically for those who seek initial teacher licensure in family and consumer sciences education, business and marketing education, and technology education. This program requires admission to Teacher Education and has specific prerequisites. Thesis and non-thesis options are available for both tracks.

**Admission Requirements**

The training and development concentration applicants are to submit an application for admission to the Teacher Education School, three letters of reference from individuals familiar with their potential for success in academic work, and a statement describing personal career objectives directly to the Department of Human Resource Development. Applicants must meet the admission requirements of the School and present evidence of ability to do graduate work, including a GPA of at least 2.7 on a 4.0 scale for the last two years of undergraduate work. Any student below this level of academic quality must justify admission via other exceptional credentials. If the applicant has prior work experience in human resource development, a reference letter should also be provided by the work supervisor. Recent Graduate Record Examination or Miller's Analog Test scores are required of all applicants except for those applying for the teacher licensure concentration. Students who have not taken an appropriate undergraduate statistics course will be required to take one as part of their graduate program. All applicants are required to be interviewed by the department admissions board.

**Teacher Licensure Concentration**

Applicants are to submit an application for admission to the Teacher Education School, five letters of reference from persons familiar with their potential for success in doctoral work, and a statement describing personal career objectives directly to the Department of Human Resource Development. Applicants must hold a master's degree from an accredited institution and present evidence of ability to do Ph.D. work, including having maintained a graduate GPA of 3.3 on a 4.0 scale or better. If the applicant has prior work experience in human resource development, a reference letter should also be provided by the work supervisor. Graduate Record Examination scores are required of all applicants. All applicants are required to be interviewed by the department admissions board.

**Degree Requirements**

The Doctor of Philosophy degree with a major in Human Ecology and a concentration in human resource development is for graduate students who seek careers in higher education or as managers/administrators of HRD. The curriculum is designed to enable students to achieve professional objectives, develop.
needed competencies, and gain desirable experiences and understanding of human resource development. Students must possess a master's degree before acceptance to the program. A minimum of 95 hours beyond the baccalaureate is required.

Concentration (15 hours): Must include courses to support Human Resource Development and may be taken from the master's degree.

Department Core (17 hours): Must include 510, 511, 512, 557, 559 or equivalents and 604.

Specialization (12 hours): Must support a career path of university faculty member or manager of education/training.

Cognate (6 hours): Must be obtained from an academic unit outside the department, support specialization, and be represented by a committee member.

Related Studies (6 hours): Research and theory in support of theoretical framework.

Research and Statistics (15 hours): Statistics must include advanced statistics such as multivariate analysis and computer application, 9 hours minimum; research methodology must include 504 and 610 or equivalents, 6 hours minimum.

Internship (0-6 hours): Required for those pursuing career path.

Dissertation (24 hours): Must be original research project.

Detailed information regarding the Ph.D. concentration program of study may be obtained from the department liaison for graduate studies.

Note: For latest update, check the homepage of Department of Human Resource Development (http://hrd.uky.edu).

GRADUATE COURSES

415 Coordination Techniques (3) Necessary procedures, duties and responsibilities to implement, maintain, and evaluate successful cooperative education program. Prereq: Senior standing and consent of instructor. Sp


503 Problems in Lieu of Thesis (3) May be repeated. Maximum 6 hrs. S/NC only. E

504 Research in Human Resource Development (3) Solution of problems encountered in human resource development. Review of studies unique to human resource development. Prereq: Approval of graduate credit. F

505 Selection, Placement, and Follow-Up Procedures in Human Resource Development (3) Methods and procedures utilized in establishing criteria for trainee selection and placement; instructional programs and in jobs. Collecting, analyzing, and reporting follow-up data appropriate for making program improvements. Prereq: Consent of instructor. Sp

506 Developing Organizational Resources (3) Strategies for developing human and organizational resources through community partnerships and relationships. Effective utilization of human resources through active learning programs. Sp

509 Internship in Human Resource Development (3) Practical field experiences in selected settings under supervision of professor and department representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E


512 Human Resource Management (3) Process and operations approach to human resource management. Interdependent human resource activities: planning, work design, staff development, training and development, compensation, etc. and organizational goals.

513 Special Topics in Human Resource Development (1-3) Specific objectives, activities, and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

514 Individual Study in Human Resource Development (3) Prereq: Consent of supervising instructor. Approval form must be filed in office of head department. May be repeated. Maximum 6 hrs. E

516 Microcomputer Operations and Programming in Education (3) Operating procedures and BASIC programing for education and training applications. Hands-on experience in operating and programming microcomputers, writing, debugging and modifying programs using sequential data files. Prereq: Teaching, administrative, or related experience in education or training or consent of instructor.

521 Design and Development of Instruction (3) Curriculum development and program planning. Design of instruction development of instructional materials for classroom and educational programs. Prereq: Consent of instructor. F


531 Organization and Supervision of V.O.E and Marketing Programs (3) Developing office and marketing occupations guidelines for cooperative laboratory, and model office programs. Trends in office and cooperative marketing, physical facilities, state plans, instructor qualifications and advisory committees. Prereq: Consent of instructor. F

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating trade, industrial and technical education programs in secondary and post-secondary school settings. Prereq: Consent of instructor. Sp, Su

551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education programs. Staff development, curriculum improvement and program updating techniques. Prereq: 455 or equivalent. F

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical problems: justification, values, principles and concepts of industrial education. Prereq: Consent of instructor. F

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in planning technical education facilities. Prereq: Consent of instructor. Sp, Su

554 Technical Program Planning (3) Instructional systems, developing, evaluating, implementing and evaluating of trade, technical education programs and related training. Prereq: Curriculum development course and consent of instructor. F, Su

555 Curriculum Planning for Industrial Education Programs (3) Developing curriculum, criterion-referenced instructional programs. Prereq: 547 or 554 or consent of instructor. Sp, Su

556 Organizational Development (3) Strategies and interventions in organizational development: training and development of staff. Models, assessment, organizational and consultant's role. Prereq: 512 or consent of instructor. F

557 Methods of Teaching Conceptual Content (3) Selection and evaluation of methods for teaching and learning conceptual content. Communication strategies for conceptual content comprehension, retention, and application.

558 Seminar in Industrial Education (1-3) Current issues, innovations, problems associated with technical programs. Prereq: 12 hrs of graduate courses. May be repeated. Maximum 6 hrs.

559 Program Evaluation (3) Concepts, principles, theories, and trends related to program evaluation. Planning and conducting a comprehensive program evaluation in various settings. Fundamentals of program evaluation, measurement, return-on-investment (ROI), and presentation and dissemination of results to stakeholders.

560 International Perspective of Workforce Training (3) Examine and compare different workforce systems in highly industrialized countries. In-school technical programs, out-of-school training systems, work training of incarcerated, retraining of displaced workers, transfer of new technologies, and role and responsibilities of businesses, private sector organizations/ agencies, and state and federal government agencies.

562 Grant Writing and Project Implementation (3) Writing and implementing self-directed work teams, motivating employees, increasing employee productivity via teams and related issues.

600 Doctoral Research and Dissertation (1-15) P/NP only. E

601 Curriculum Planning in Human Resource Development (3) Curriculum theory, models, contents, planning evaluation and implementation of specialized program areas. Prereq: 555 or equivalent. F

604 Research Forum in Human Resource Development (2) Development of theoretical framework, research design, evaluation techniques and qualitative and quantitative techniques for investigations of problems and issues in human resource development. Prereq: Consent of instructor. Fall only. Continuous enrollment required for 2 yrs. May be repeated. Maximum 12 hrs. S/NC only. E

610 Research Development in Human Resource Development (3) Proposal development, theoretical base,
Inclusive Early Childhood Education

(College of Education)

MAJORS

DEGREES

Education .................................................. M.S., Ph.D.

Susan Benner, Leader

Professors:

Benner, Susan M., Ed.D. ....................... Columbia
Coleman, Laurence J., Ph.D. ................. Kent State
Hatch, J. Amos, Ph.D. ....................... Florida

Failon, Susan, M.Ed. ......................... Georgia

Assistant Professor:

Judge, Sharon L., Ph.D. ....................... California (Santa Barbara)

The inclusive Early Childhood Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Education

Track 1-special education: early childhood

Track 1-elementary education

Track 2-special education: early childhood

Track 2-elementary teaching

Doctor of Philosophy

Education

Early childhood education

See Education under Fields of Instruction for full description of all degree requirements. Early childhood licensure and degree programs are also available through the College of Human Ecology.

The unit is focused on the preparation of teachers for the education of all young children with and without disabilities in inclusive settings. All young children are defined here as those with birth at age eight, including children of poverty, those of color, with disabilities, with advanced development and "mainstreamed" children.

GRADUATE COURSES


454 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of giftedness; Analysis of past and present school practices in reference to curriculum and program implementation. Sp

471 Early Childhood Special Education (5) Assessment, curriculum planning and development and teaching approaches used in early childhood special education. Prereq: Admission to teacher education.

500 Thesis (1-15) P/NP only.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

503 Problems in Lieu of Thesis (2-3) May be repeated.

504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade. (Same as Rehabilitation and Deafness 504.)

515 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of student's program. May be repeated. Maximum 6 hrs. S/NC only. E

516 Educational Specialist Research and Thesis (3) May be repeated. P/NP only.

550 Research Methods in Education (3) Principles of action research and practical inquiry for practitioners in early childhood and school settings and methods for conducting such inquiries in professional role. Prereq: Admission to graduate program.

554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in areas such as formal and informal assessments of handicapped infants and young children; screening, identification, diagnosis, placement and programming assessment issues. Prereq: 553 or consent of instructor.

558 Neuromuscular and Health Disorders: Educational Implications (3) Neurological impairments, physical disabilities, and special health conditions. Investigation of instructional techniques and adaptations.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school, and society. Implications of misadjustment. Prerequisites: for promoting social and emotional development. Prereq: 545 or 546 or equivalent or consent of instructor.

565 Instructional Systems for the Gifted and Talented (5) Instructional methods and systems evaluated in terms of effectiveness in various educational environments. Prereq or coreq: 554 or consent of instructor.

566 Curriculum for Early Childhood Education (K-3) (3) Theoretical foundations and current research in content and skills of curriculum for kindergarten-grade 3; application to local school setting. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

567 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prereq: Course in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

568 Early Childhood Special Education: Theories and Interventions (3) Theoretical perspectives of early childhood special education: exploration of programmatic models and their relationship to practice. Prereq or coreq: 565 or consent of instructor.


591 Clinical Studies (4) Relationship between educational theory and application during internship; research project, development of portfolio, and capstone experience.

593 Independent Study (1-3) May be repeated. S/NC or letter grade.

595 Special Topics (1-3) May be repeated. S/NC or letter grade.

597 Special Topics (1-3) May be repeated. S/NC or letter grade.

679 Special Topics (1-3) May be repeated. S/NC or letter grade.

Industrial and Organizational Psychology

(College of Business Administration)

MAJOR

DEGREES

Industrial and Organizational Psychology .......................... Ph.D.

Robert T. Ladd (Liaison), Director

Committee:

Fowler, Oscar S., Management
Jones, Lawrence R., Management
Larsen, John M., Jr. (Emeritus), Management
Rush, Michael C., Management
Russell, Joy E. A., Management
Schumann, David W., Marketing, Logistics & Transportation

The doctoral program is designed to prepare students for professional, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientist/practitioner model in applying and conducting research design, sampling, and evaluation of effectiveness in research in human resource development.

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

504 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/NC only.

610 Internship in College Teaching and Supervision (0-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in research-based education: clinical supervision by professional engaged in research-based education. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioner. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

640 Theoretical Analysis and Theory Construction (3) Critical analysis of paradigms and theories relevant to educational research. Prerequisites include research methodology and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientist/practitioner model in applying and conducting research design, sampling, and evaluation of effectiveness in research in human resource development.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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.

503 Problems in Lieu of Thesis (2-3) May be repeated.

504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade. (Same as Rehabilitation and Deafness 504.)

515 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of student's program. May be repeated. Maximum 6 hrs. S/NC only.

516 Educational Specialist Research and Thesis (3) May be repeated. P/NP only.

550 Research Methods in Education (3) Principles of action research and practical inquiry for practitioners in early childhood and school settings and methods for conducting such inquiries in professional role. Prereq: Admission to graduate program.

554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in areas such as formal and informal assessments of handicapped infants and young children; screening, identification, diagnosis, placement and programming assessment issues. Prereq: 553 or consent of instructor.

558 Neuromuscular and Health Disorders: Educational Implications (3) Neurological impairments, physical disabilities, and special health conditions. Investigation of instructional techniques and adaptations.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school, and society. Implications of misadjustment. Prerequisites: for promoting social and emotional development. Prereq: 545 or 546 or equivalent or consent of instructor.

565 Instructional Systems for the Gifted and Talented (5) Instructional methods and systems evaluated in terms of effectiveness in various educational environments. Prereq or coreq: 554 or consent of instructor.

566 Curriculum for Early Childhood Education (K-3) (3) Theoretical foundations and current research in content and skills of curriculum for kindergarten-grade 3; application to local school setting. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

567 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prereq: Course in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

568 Early Childhood Special Education: Theories and Interventions (3) Theoretical perspectives of early childhood special education: exploration of programmatic models and family-focused concepts and curriculum development.

575 Creative Problem-Solving Strategies for Special Educators (3) Techniques for solving problems encountered by special educators in any setting.

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/NC or letter grade.


591 Clinical Studies (4) Relationship between educational theory and application during internship; research project, development of portfolio, and capstone experience.

593 Independent Study (1-3) May be repeated. S/NC or letter grade.

595 Special Topics (1-3) May be repeated. S/NC or letter grade.

Industrial and Organizational Psychology

(College of Business Administration)

MAJOR

DEGREES

Industrial and Organizational Psychology .......................... Ph.D.

Robert T. Ladd (Liaison), Director

Committee:

Fowler, Oscar S., Management
James, Lawrence R., Management
Larsen, John M., Jr. (Emeritus), Management
Rush, Michael C., Management
Russell, Joyce E. A., Management
Schumann, David W., Marketing, Logistics & Transportation

The doctoral program is designed to prepare students for professional, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientist/practitioner model in applying and conducting research design, sampling, and evaluation of effectiveness in research in human resource development.
research based on accepted theory, organizational behavior, psychology, management, and statistics. The degree program is administered by a committee appointed by the Associate Vice Chancellor and Dean of The Graduate School on recommendations from the Management Department head and the program director.

It is intended that students entering the I/O 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 that will assist the students in attaining a reasonable level of sophistication in areas of deficiency.

**ADMISSION REQUIREMENTS**

Applicants for admission should request information and application forms from both the Office of Graduate Admissions and Records (218 Student Services Building) and the Director, Industrial and Organizational Psychology Program (408 Stokely Management Center, The University of Tennessee, Knoxville, TN 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: New students are admitted infall semester only, and applications must be received by the Graduate Admissions and Records Office by February 1.

The master's degree in Industrial and Organizational Psychology is generally not required of individuals pursuing a doctoral degree.

**General Requirements**

At least one year of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade-point average of 3.5 or above is required with no evidence of special weakness in mathematics and physical sciences. A passing score on each section of the general portion (verbal and quantitative) of the Graduate Record Examination (GRE) are required. Customarily, those students admitted to the program have performed at or above the 69-79th percentile on the general tests. (This corresponds to a raw score of approximately 600 on each of the tests.)

### THE DOCTORAL PROGRAM

The Ph.D. degree with a major in Industrial and Organizational Psychology can be completed with a minimum of 90 semester hours in the major. Students must be in residence full time for one year; must maintain an overall 3.0 grade-point average with no more than one grade below B in the I/O Psychology, General Psychology, and Statistics core; must complete an applied research project prior to beginning dissertation work; must pass a comprehensive examination; and must pass a final oral examination on their dissertation research.

**Course Requirements:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tr>
<td>I/O Psychology Core</td>
<td>9</td>
</tr>
<tr>
<td>567, 568, 8, 569</td>
<td></td>
</tr>
</tbody>
</table>

### Research Core

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Principles</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 537 &amp; 538</td>
<td></td>
</tr>
<tr>
<td>Multivariate Statistics</td>
<td>9</td>
</tr>
<tr>
<td>Statistics 579, 679,</td>
<td></td>
</tr>
<tr>
<td>or equivalent</td>
<td></td>
</tr>
<tr>
<td>Advanced Research</td>
<td>12</td>
</tr>
<tr>
<td>Methods</td>
<td></td>
</tr>
<tr>
<td>(605 or equivalent)</td>
<td></td>
</tr>
</tbody>
</table>

### General Psychology Core

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological principles</td>
<td>9</td>
</tr>
<tr>
<td>One course in each of</td>
<td></td>
</tr>
<tr>
<td>the following areas:</td>
<td></td>
</tr>
<tr>
<td>biological bases of</td>
<td></td>
</tr>
<tr>
<td>behavior, cognitive</td>
<td></td>
</tr>
<tr>
<td>bases of behavior,</td>
<td></td>
</tr>
<tr>
<td>history, and systems</td>
<td></td>
</tr>
<tr>
<td>of psychology.</td>
<td></td>
</tr>
</tbody>
</table>

### I/O Psychology Seminars

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 level IOPSY courses</td>
<td>9</td>
</tr>
<tr>
<td>from program</td>
<td></td>
</tr>
<tr>
<td>committee approved list</td>
<td></td>
</tr>
<tr>
<td>Approved Electives</td>
<td>9</td>
</tr>
<tr>
<td>Courses supporting the</td>
<td></td>
</tr>
<tr>
<td>student's course of</td>
<td></td>
</tr>
<tr>
<td>study, supervised</td>
<td></td>
</tr>
<tr>
<td>practicum, internship,</td>
<td></td>
</tr>
<tr>
<td>or field training</td>
<td></td>
</tr>
<tr>
<td>(860)</td>
<td>15</td>
</tr>
<tr>
<td>Ethics (635 or</td>
<td>3</td>
</tr>
<tr>
<td>equivalent)</td>
<td></td>
</tr>
<tr>
<td>Dissertation (600)</td>
<td>24</td>
</tr>
<tr>
<td>TOTAL</td>
<td>90</td>
</tr>
</tbody>
</table>

### ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program is available to residents of Alabama, Arkansas, Kentucky, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

### ACADEMIC PERFORMANCE

**502 Registration for Use of Facilities (1-15)** Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is complete. May not be used toward degree requirements. May be repeated. S/NC or letter grade.

**525 Research in Industrial/Organizational Psychology (1-3)** Available only to students admitted to program or by prearrangement with program director. May be repeated. Maximum 6 hrs. S/NC or letter grade.

**567-68 Proseminar in Industrial/Organizational Psychology (3-3) Basic thought, concepts, and issues required for advanced graduate study in industrial and organizational psychology. Must be taken during first year of study in program. Consent of instructor required for non-program students.**

**569 Applied Measurement for Industrial/Organizational Psychology (3) Basic techniques for collection and evaluation of individual and organizational data using classical and modern psychometric techniques. Relevant statistical methods: reliability analysis, and exploratory and confirmatory factor analysis.**

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

**605 Advanced Research Methods in Psychology (3) Critical analysis of new and evolving techniques for psychological research; new statistical and psychometric methods.**

**610 Individuals in Organizations Seminar (3) Bridging principles and processes which link individual attributes with more macro organization concepts, culture, climate, and group decision making.**

**611 Seminar in Organizational Leadership (3) Current theories, concepts, and issues associated with psychology of organizational leadership. Prereq: 567-68 or consent of instructor.**

**612 Seminar in Work Motivation (3) Current theories, concepts, and issues associated with psychology of work motivation. Prereq: 567-68 or consent of instructor.**

**613 Seminar in Performance Appraisal (3) Current issues, problems, and research in performance appraisal and criterion development; applications in compensation. Prereq: 567-68 or consent of instructor.**

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**Industrial Engineering**

(College of Engineering)

**MAJOR DEGREES**

Industrial Engineering .............. M.S., M.S.-MBA

T. E. Shannon, Acting Head

Professors:

Bontadelli, J. A. (Liaison), PE, Ph.D. Ohio State
Claycombe, W. W., PE, Ph.D. ................. VPI
Devine, Michael D., Ph.D. ............... Texas
Garrison, G. W. (UTSI), Ph.D. .............. NC State
Loveless, Howard L. (Emeritus), PE, M.S. .................. NC State
Shannon, T. E., PE, Ph.D. ............... Tennessee

Associate Professors:

Alkens, C. H., PE, Ph.D. .......... Tennessee
Hallery, M. L. (UTSI), PE, Ph.D. ....... Texas Tech
Hungerford, J. C., Ph.D. ............. Ohio State
Jackson, D. F., Ph.D. ................. Tennessee
Kirby, K. E., Ph.D. ................. Tennessee
Liggett, H. R., Ph.D. .............. NC State

Assistant Professors:

Colman, G. D. (UTSI) PE, Ph.D. ......... VPI
Ford, R. E., Ph.D. ................. Tennessee
Kress, T. A., Ph.D. ................. Tennessee
Sawhney, Rupy S., Ph.D................. Tennessee

The Department of Industrial Engineering offers a graduate program leading to the Master of Science degree with a major in Industrial Engineering, concentrations in traditional industrial engineering, engineering management, and manufacturing systems engineering. This Ph.D. with a major in Engineering Science is available through the Department of Mechanical and Aerospace Engineering and Engineering Science with a concentration in industrial engineering.
THE MASTER’S PROGRAM

Students who enroll in the Master of Science degree may select a concentration in industrial engineering, engineering management or manufacturing systems engineering. Admission is open to graduates of ABET-accredited undergraduate curricula in engineering, or to graduates of other technical curricula who satisfy prerequisite requirements depending on their academic backgrounds. Policies concerning prerequisite requirements will be determined by the Industrial Engineering faculty.

Industrial Engineering

Under the industrial engineering concentration, students may select either the thesis or non-thesis option. The thesis option requires 27 hours of coursework and 6 hours thesis. The non-thesis option requires 30 hours of coursework plus a 3-hour design project. Depending upon a student’s background and career objectives, graduate work in industrial engineering enables the student to select an area of specialization from operations research, human computer interaction, information systems engineering, maintenance and reliability engineering, or general industrial engineering.

Engineering Management

The engineering management concentration has an additional admission requirement of two years’ U.S. industrial experience as a practicing engineer or scientist, or current full-time employment in an appropriate engineering or applied science position. The program is non-thesis and requires 33 hours of coursework plus a 3-hour design project. This concentration is fully supported off-campus utilizing electronic media for video taping and interactive distance teaching methods.

Manufacturing Systems Engineering

Under the manufacturing systems engineering concentration, students may select either the thesis or non-thesis option when taking the M.S. degree program, or the non-thesis option only when taking the M.S.-M.B.A. degree program. The thesis option requires 27 hours of coursework and 6 hours of thesis. The non-thesis option requires 30 hours of coursework (33 hours in the dual M.S.-M.B.A. program) plus a 3-hour design or industrial project problem.

DUAL M.S.-M.B.A PROGRAM

The College of Engineering and the College of Business Administration offer a coordinated program leading to the Master of Science degree with a major in Industrial Engineering (concentration in manufacturing systems engineering) and the Master of Business Administration degree (concentration in manufacturing management). The dual program saves the student one or two semesters over the time that would be required to earn both degrees independently.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate this increasingly complex body of knowledge into the efficient operation of manufacturing and production firms. The program is designed to accommodate the interests of students who desire a career leading to a leadership position in a manufacturing/production organization.

Admission Requirements

Applications are accepted for fall semester only. Applications for the M.S.-M.B.A. program must be separated and submitted to, and be competitively and independently reviewed by, The Graduate School for the Master of Business Administration degree program and the Master of Science degree program with a major in Industrial Engineering, and by the Dual Program Committee.

Students will initially apply for the MBA program, indicating on that application the intent to pursue the dual M.S.-M.B.A. program in manufacturing (refer to the MBA program for separate instructions). Students accepted for both degree programs will be assigned by the Dual Program Committee advisors who will be responsible for supervision of the student’s progress through the dual program.

Applications by U.S. citizens and permanent residents received after the MBA application deadline (March 1) will be deferred as space allows. Additional information is required, and different application dates are established by The Graduate School for international students.

Curriculum

The curriculum in the first academic year of the dual M.S.-M.B.A. program is the two-semester core of the MBA program (two 15-hour courses, one each semester). A 1-hour seminar course each semester in manufacturing will also be taken concurrently during the first two semesters (may be for graduate credit). A 3-hour design or industrial project course will be accomplished in the summer term of the first year. This will be part of a summer internship in industry, and the project will be academically supervised by a faculty member associated with the dual program.

During the second year, 27 hours of coursework will be completed in the manufacturing systems engineering concentration in Industrial Engineering plus an additional 9 hours of graduate courses in the College of Business Administration acceptable in meeting the requirements of the MBA program. Fifteen hours will be taken during each of the first two semesters of the second academic year. A culminating 6-hour integrated case study requiring use of most previous material, and a final examination as required by the Dual Program Committee, will be taken during the first session of summer term of the second year.

The dual degree candidate must satisfy the curriculum and graduation requirements of the Department of Industrial Engineering and the College of Business Administration. The Master of Science degree students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation in either degree program for courses in the other degree program, except as such courses qualify for credit without regard to the dual degree program. The M.S. and the M.B.A. degrees will be awarded upon successful completion of the requirements of the dual program.

Approved Dual Credit

A maximum of 6 semester hours of approved graduate-level courses completed in the College of Business Administration may be counted toward the M.S. degree program with a major in Industrial Engineering. A maximum of 15 semester hours of approved graduate-level courses completed in the Department of Industrial Engineering may be counted toward the MBA degree program. The approval of courses is the responsibility of the Dual Program Committee and the student’s assigned advisor.

Note: Any 400-level course required in the Bachelor of Science in Industrial Engineering program at UT Knoxville may not be used for graduate credit in the M.S. degree program.

Industrial Engineering

GRADUATE COURSES


402 Production System Planning and Control (3) Theory and application of forecasting systems, regression and time series models, dependent demand inventory models, development of safety stock levels. Coverage of modules of Manufacturing Resource Planning (MRP) Systems: master production scheduling, resource requirements planning, bill of material and inventory life structures, material requirements planning, capacity planning, shop floor and purchasing order control. Overview of just-in-time inventory concepts and MRP II role in manufacturing automation. Prereq: 401.

403 Production Facilities Design and Material Handling (3) Design of production facilities: plant layout, analysis and planning for overall moving, packaging and storage of materials. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. Design of facilities for such diverse production service areas. 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421 Information Systems Analysis and Design (3) Systems engineering approach to analysis, design, development, and implementation of systems of information. Information systems aspects of industrial engineering systems. Utilization of relevant software packages. Prereq: Simulation or consent of instructor. 2 hrs and 1 lab.

422 Senior Industrial Engineering Problems Analysis (3) Application of industrial engineering to field assignments in local organizations, problem definitions, analysis and presentation. Prereq: 402, 403, and 404.


440 Process Improvement Through Planned Experimentation (3) Fundamentals of continuous improvement, advanced statistical process control techniques, and strategies for short production runs. Use of experimental design techniques to improve processes: single and multiple-factor designs, blocking and confounding, and fractional designs. Full factorial designs compared to fractional designs to balance experimental efficiency with loss of information. Lab component utilizes statistical and simulation software to provide hands-on experience. Prereq: Engineering Data Analysis and Process Improvement, Simulation, Probability and Statistics for Scientists and Engineers or consent of instructor.

484 Introduction to Maintenance and Reliability Engineering (3) Same as Nuclear Engineering 484, Materials Engineering 484, Industrial Engineering 484.
522 Optimization Methods in Industrial Engineering (3) Classical optimization applied to constrained and unconstrained, non-linear, and linear functions; search techniques; decision making under uncertainty; game theory; and dynamic programming. Prereq: Operations Research or Engineering Management 537.
523 Mathematical Programming (3) (Same as Management Science 531.)
526 Systems Modeling and Simulation (3) Modeling of discrete, continuous, and combined systems using current simulation software. Input distributions, output data analysis, model validation, variance reduction techniques, and design of simulation experiments. (Same as Management Science 526.)
527 Lean Production Systems (3) Characteristics and performance of mass and lean production systems. Lean production concepts and principles. Planning, designing, and implementing lean production systems: line balancing, set-up time reduction, maintenance support and other selected topics. Application at enterprise level to achieve competitive goals. Prereq: 515 or consent of instructor.
591-92-93 Special Topics in Industrial Engineering (1-3-3) See bulletin for topics. Prereq: Consent of instructor. May be repeated.
602 Nonlinear Optimization (3) (Same as Management Science 561.)
606 Advanced Topics in Human Factors, Safety and Biomechanical Engineering (3) Application of advanced engineering design and management systems to human factors, safety and biomechanical engineering. Prereq: Consent of instructor.
691-92-93 Advanced Topics in Industrial Engineering (1-3-3) See bulletin for topics. Prereq: Graduate standing and consent of instructor. May be repeated with consent of instructor.

Engineering Management

Graduate Courses

501 Capstone Project (3-6) Application-oriented project to show competence in major academic area. Prereq: Enrollment in a Master's program in engineering management. May be repeated. Maximum 6 hrs. S/N only.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only.
521 Advanced Human Factors Engineering Methodology (3) Advanced methodologies used in human factors engineering. Observations, functional analysis, computerized human factors design methods, human reliability and error prediction, evaluation of human-machine interface, modeling techniques, questionnaire and survey design, human performance measurement, and other selected topics. Prereq: 519 or consent of instructor.
532 Productivity and Quality Engineering (3) Productivity and quality measures defined and used to analyze current competitive position of important sectors of American industry with regard to international competition. Study of management theorists and systems which promote or inhibit productivity or quality improvements.
533 Theory and Practice of Engineering Management (3) Management: conceptual, objective; systems thinking; managing technology and planning; marketing and competition in global economy; finance; organization; systems thinking; team building; corporate culture and leadership in new organization; and quality, empowerment, and learning organizations. Principle application to work settings and case studies.
536 Project Management (3) Development and management of small technical projects. Project proposal preparation; resource allocation; and contract negotiations. Discussion of typical problems and alternative solutions. Case study and student projects. Prereq: 537 or consent of instructor.
537 Analytical Methods for Engineering Managers (3) Survey of management analysis and control systems through IE techniques. Qualitative and quantitative systems analysis; data analysis; model validation, variance reduction techniques, and design of simulation experiments. Not for credit students with undergraduate degrees in industrial engineering.
538 New Venture Formation (3) Factors other than mechanical or chemical which enter into successful establishment of a manufacturing or service enterprise. Organizational and financial planning; corporate vision and mission; product, market, organizational, and financial strategies; external factors; corporate culture and management; strategic management control systems, and other selected topics. Prereq: 539.
539 Strategic Management in Technical Organizations (3) Strategic management of small technical projects. Project management and planning, project team building, conflict resolution, and contract negotiations. Discussion of typical problems and alternative solutions. Case study and student projects. Prereq: 537 or consent of instructor.
541 Total Quality Management and Beyond (3) Continuous improvement in capabilities, competitiveness, and productivity of organizations. Principles of total quality management; systems thinking; performance measurement, and application of statistical techniques in continuous improvement. Team building and leadership issues, and case studies. Prereq: 516.
543 Legal and Ethical Aspects of Engineering Management (3) Legal aspects imposed by government and ethical responsibilities in engineering practice. Selected readings, lecture, discussion, and student presentations. Current topics from government and industry.

Science and Engineering 484, and Mechanical Engineering 484.)
Information Sciences

(Office of the Vice Chancellor for Academic Affairs)

MAJOR DEGREE
Information Sciences M.S.

Elizabeth Aversa, Director

Professors:
Aversa, Elizabeth, Ph.D. Drexel
Tencapir, Carol, Ph.D. Illinois Wilson, P. (Emeritus), Ph.D. Michigan

Associate Professors:

Assistant Professors:
Bilal, Dania, Ph.D. Florida State Raber, Douglas, Ph.D. Indiana Wang, Peiling, Ph.D. Maryland Watson, Jinx, Ed.D. Vanderbilt Whitney, Gretchen, Ph.D. Michigan

The School of Information Sciences provides a program leading to the preparation of librarians and information professionals for work in all types of libraries and information centers. The program of study includes a graduate curriculum leading to the Master of Science degree. The program is accredited by the American Library Association. A Ph.D. degree program may also be pursued with a major in Communications, concentration in information sciences.

The mission of the school is to educate people to live, work, and flourish in an information society through excellence in teaching, research, and public service in Information Sciences. The goals and objectives of the school are:

1. To prepare students to understand the nature of information and the role of the library and other information agencies in the management of information resources, and the facilitation of information transfer. Students will demonstrate:
   - Knowledge of the generation, production, management, dissemination and use of information.
   - Knowledge of the roles of various organizations/institutions in promoting the flow of information.
   - An understanding of the role of the information professional as mediator between information resources and their users.
   - An understanding of the roles of various tools and technologies in facilitating access to information.
   - An understanding of the structure and content of information resources in various formats and subjects.
   - Knowledge of theoretical and practical evolution of information sciences and technologies and their relationship with other disciplines.
   - Competence in creating, managing, and accessing information in a variety of formats.

2. To provide services to the state, region, and nation in association, consulting, and continuing education activities which will promote the development and improvement of information systems and services such that the school's contributions reach beyond its immediate academic programs. The school will provide:
   - Continuing education for information professionals and, on a selective basis, to persons outside the information field.
   - Advisory services to information organizations.
   - Leadership for professional associations.
   - To conduct basic and applied research which promotes the generation of new knowledge, services and technology. The school will encourage:
     - Research which strengthens its instructional and public service programs.
     - The use of a variety of research methods.
     - Sharing the results of its research.
     - Increased research quality and productivity.

ADMISSION REQUIREMENTS

Applicants to the Information Sciences program must have a minimum undergraduate grade-point average of 3.0 or a satisfactory graduate degree grade-point average for admission as a potential candidate for the M.S. degree.

The verbal, quantitative and analytical aptitude portions of the Graduate Record Examination (GRE) are required of all applicants unless a graduate degree has been completed prior to application for admission. Applicants should take the GRE at least one semester in advance of application for admission and are expected to score 1500 points or better.

A personal data sheet and three recommendations (obtained from the School of Information Sciences) should be returned to the admissions office of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

THE MASTER'S DEGREE

The program leading to the Master of Science involves a total of 42 semester hours of graduate courses, 15 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 6 hours required for thesis credit. At least 36 hours must be taken in the School of Information Sciences, allowing up to 6 hours outside the school with a maximum of 6 from outside the University.

Core Curriculum

The core curriculum is a 15 semester hour sequence of five courses required of all students: 490, 520, 530, 580, 580. These courses address the evolving information environment; foundations of information sciences and technologies; information resources selection, acquisition and evaluation; information content representation; information access and retrieval.

The 15-hour core is prerequisite to all elective courses for students enrolled in the M.S degree program. Elective courses may begin in the final semester of core course work with permission of the advisor and the instructor of each elective course selected.

Individualized Curriculum Approach

Students, in consultation with their advisor, may wish to pursue a curricular focus to develop an individualized program of study. Graduates of the school have prepared themselves for a variety of careers, including positions as: corporate information specialist, public librarian, records manager/archivist, web-page designer, indexer/abstractor, online information retrieval specialist, medical or law librarian, reference librarian, youth services specialist, and many others. Once the core courses have been completed, students are encouraged to take advantage of the individualized curricular approach.

Whatever individualized curriculum is chosen, all students who complete the program receive an M.S. degree accredited by the American Library Association (ALA).

For those pursuing Tennessee Department of Education licensure as a school library information specialist, stipulated requirements apply. See following section.

Tennessee State Department of Education School Library Information Specialist Requirements

The requirements for the Tennessee State Department of Education School Library Information Specialist Initial Endorsement include the 15-hour core plus 551, 587, 571, 572, 585, 595 (9 hours), and 573. IS 595 and 573 must be taken concurrently in the student's final semester. Students pursuing the endorsement must follow the non-thesis option.

The Tennessee State Department of Education School Library Information Specialist Initial Endorsement is also available to candidates who have earned an ALA-accredited Master's degree. Students are required to take 24 hours consisting of 551, 571, 572, 587 or 593 (upon approval of the faculty advisor), 595 (9 hours), and 573. IS 595 and 573 must be taken concurrently in the student's final semester.

Additional Program Requirements

Thesis Option

Students electing the thesis option will write a master's thesis under close supervision of a thesis committee. Six hours of Thesis (IS 500) must be taken within the 42 hours required for graduation. (Students may register for more than 6 hours of 500, but only 6 hours will count toward graduation.) Students must be registered for IS 500 in the semester they complete and defend their thesis. The oral defense of the thesis (final comprehensive examination) substitutes for the written examination that is taken by non-thesis students. The writing of the master's thesis serves as the culminating experience.

Non-Thesis Option

Upon completion of the program, all students who elect the non-thesis option must take and pass a written comprehensive examination. A culminating experience is also required which must be completed in one of the student's last two terms with a grade of B or better (except as noted) selected from the following and approved by the student's advisor: 587 Information System Design Project, 590 Problems in Information Sciences, 591 Supervised Readings in Information Sciences, 592 Seminar in Information Sciences, 593 Independent Study, 594 Graduate Research
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 may extend the period required for the degree. 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 teaching assistantships are available through the school. 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.

For application forms and information about financial aid and other information about the M.S. in Information Sciences, write to Admissions, School of Information Sciences, University of Tennessee, 804 Volunteer Blvd., Knoxville, TN 37996-4330.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Information Sciences is available to residents of the states of Arkansas, Georgia, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

430 History of the Book (3) History of writing and various methods of bookmaking.
450 Writing About Science, Technology and Medicine (3) (Same as Journalism 450.)
475 Utilization of Instructional Media (3) (Same as Education in the Sciences, Mathematics, Research and Technology 475.) E
485 Electronic Communications and Information Resources on Internet (3) Exploration of worldwide information and communication resources including e-mail, gopher, Archie, Veronica, WAIS, WWW, and newsgroups. F,Sp
490 Information Environment (3) Generation, production, management, dissemination, and use of information. Roles of information in society, information seeking and user behavior, information industry, economics of information products and services, technological and organizational change, information professions, and issues. E, A
500 Thesis (1-15) P/NP only. E
502 Registration and Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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
520 Information Content Representation (3) Principles of distinguishing, describing, and indexing intellectual works; current approaches; citation systems, descriptive cataloging, non-subject access and online computerized subject subject indexing, classification and categorization; authority control of index terms; standards. E, A
521 Cataloging and Classification (3) Basic library-oriented cataloging and classification techniques, tools, and supporting operations. Descriptive cataloging, choice and form of non-subject entries, subject heading work, general classification, authority control, bibliographic utilities, online library catalogs.
522 Advanced Cataloging and Classification (3) Cataloging and classification of more difficult materials, use of larger classification and subject heading systems. Library of Congress Classification, Library of Congress Subject Headings, and Introduction to Medical Subject Headings. Prerequisite: 521.
523 Abstracting and Indexing (3) Philosophies, standards, and procedures for manual and automatic document indexing, back-of-the-book indexing, vocabulary control, thesaurus construction, and abstracting.
530 Information Access and Retrieval (3) Media for information storage, logical and physical information structures, query logic and languages, search strategies and heuristics, user interfaces, evaluation of retrieval system performance. Search techniques for various types of databases including multi-media, full-text, numeric, bibliographic. E, A
531 Sources and Services for the Social Sciences (3) Information sources in political science, sociology, psychology, geography, history, anthropology, business, and education.
532 Sources and Services for Science and Engineering (3) Information sources in engineering, physical and life sciences.
533 Sources and Services for the Humanities (3) Information sources in philosophy, religion, fine arts, performing arts, literature, and language. Organization and management of regional collections.
534 Government Information Sources (3) Selection, acquisition, organization, and utilization of government information in various formats from legislative, judicial, and executive branches of federal, state, local, and international government and intergovernmental agencies. Sp
535 Advanced Information Retrieval (3) Bibliographic, non-bibliographic, full-text databases, e.g., non-bibliographic formula and structured databases, contents-page/full-text databases, patents; document delivery alternatives, evaluation, and testing. Sp
537 Information Industry (3) Issues and trends concerning information industry; products and services. Standards, enabling technologies, choice of distribution media, entrepreneurial opportunities. Legal, ethical, and quality concerns.
538 Economics of Information (3) Costing and pricing of information, value of information and value added services, cost-benefit analysis and trade-offs, policy issues relating to economic aspects of information exchange and transfer.
539 Information Policy (3) Role of government in creation and exchange of information; review of key national and international policy for the emerging information society. Copyright, public information, commercial production, and distribution; development of information policy for organizations. F
540 Research Methods (3) Research methods in property of information environments; primary and secondary research design; research report prepared. Analysis of published research; technical support for research process. E
550 Management of Information Organizations (3) Supervision and management concepts, strategies, and techniques applicable to information professional working in libraries, archives, records management, and other information organizations. F
551 School Library Media Centers (3) Planning, implementing, and evaluating school library programs. Curriculum involvement, role of technology in instruction, and evaluation of program. Prerequisite: 540.
552 Information Centers in Higher Education (3) Development, mission, trends, issues, users, services, and environment of campus information centers including libraries and alternatives: learning resources center and library-computer center models. F
553 Corporate Information Services (3) Development and present status, scope and objectives. Information resources external to organization.
564 Public Library Management and Services (3) Development, roles, political environment, governance, organization, financial management, services, marketing, and performance evaluations. Sp
555 Scientific and Technical Communications (3) Evolution of scientific and technical communication; current trends, role of formal and informal communications; major STI organizations and their roles.
557 User Instruction (3) Theory, strategy, design, and practice in providing instructional services and technology for and use of information and information systems. Includes practical experience.
560 Information Resources Selection, Acquisition, and Evaluation (3) Principles of development and management of collections in information agencies; community analysis; users and users' policies and procedures; evaluation of items and collections; selecting items to meet particular needs. E, A
561 Contemporary Book Publishing (3) Creation, design, production, marketing, and distribution; various types of publishers.
563 Graphic Design and Media (3) Principles and practice in visual aspects of communications. Graphic design, typographic, production techniques and publication design, as these apply to electronic information delivery systems. F
566 Environmental Scanning for Information Professionals (3) Principles and practice in environmental scanning; information evaluation and synthesis; role of strategic information in modern organization.
571 Information Network Applications (3) Scholarly and business electronic communications. National and international standards, tools, resources; identification, analysis, evaluation, and management of tools and resources; construction of local technologies as developed and applicable. F, Sp
572 Resources for Young Adults (3) Critical survey of books and related materials for children, development of genres. Evaluation, selection, and utilization for school and public libraries. Sp
573 Programming for Children and Young Adults (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. Prerequisite: 572.
574 Adult Materials and Services (3) Popular information on professional materials and services to meet adult interests in a variety of formats. Development of specialized collections.
580 Foundations of Information Sciences and Technologies (3) Definitions of information, information sciences, and information technology; information, information representation, retrieval, and transfer; standards and technologies for information processing and distribution; research front; bibliometrics and informetrics; relationships with other disciplines. E, A
581 Seminar in Radio and Television (3) (Same as Broadcasting 550.)
582 Library Automation (3) Computer-based applications and systems for libraries including MARC, bibliographic utilities, retrospective conversion, circulation systems, online catalogs, computer-based reference services.
Interdisciplinary Programs
(College of Arts and Sciences)

The College of Arts and Sciences offers a series of interdisciplinary undergraduate

majors and minors through its interdisciplinary Programs. These programs include African and African-American Studies, American Studies, Ancient Mediterranean Civilizations, Asian Studies, Cinema Studies, Comparative Literature, Environmental Studies, Latin American Studies, Legal Studies, Judaic Studies, Linguistics, Medieval Studies, Urban Studies and Women's Studies. Certain courses within these programs are available for graduate credit as listed below. See the Undergraduate Catalog for program descriptions and directors.

African and African-American Studies

GRADUATE COURSES

421 Comparative Studies in African and African-American Societies (3) Education, religion, and social stratification. Views African-Americans and Africans have of each other and concept of Pan-Africanism. F, Sp

591 Supervised Readings in Information Sciences (3) Prereq: Consent of advisor. May be repeated. Maximum 6 hrs. F, Sp

592 Seminar in Information Sciences (3) Prereq: Consent of advisor. May be repeated. Maximum 6 hrs. F, Sp

593 Independent Study (3) Prerequisite: Consent of advisor. Maximum 6 hrs. F, Sp

594 Graduate Research Participation (3) Advanced research techniques under supervision of staff. F, Sp

595 Student Teaching in School Library Information Center (6) Planned professional seminar: full-day school library work and classroom observation activities. F, Sp

599 Practicum (3) Opportunity to translate theory into practice under guidance of qualified information professional. Prereq: Completion of core and pertinent advanced courses relevant to student's practicum design. Minimum 3.0 cumulative GPA. Written consent of advisor and approval of practicum coordinator. May be repeated. Maximum 6 hours. F, Sp

601 Advanced Seminar in Information Sciences (3) Theories, research, and traditional practices of information representation, organization, and access and retrieval. Research opportunities and methods. Relationship to and interaction with other disciplines.

American Studies

GRADUATE COURSES

423 Geography of American Popular Culture (3) Same as Geography 423.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Ancient Mediterranean Civilizations

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Asian Studies

GRADUATE COURSES

471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 6 hrs.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Cinema Studies

GRADUATE COURSES

400 Special Topics (3) May be repeated. Maximum 6 hrs.

420 French Cinema (3) Same as French 420.
421 Topics in Italian Literature and Cinema (3) Same as Italian 421.
433 Modern Art and Film (3) Same as Art Media/Photography 433.
469 Sexuality and Cinema (4) Same as Women's Studies 469.
489 Special Topics in Film (3) Same as English 489.

Comparative Literature

GRADUATE COURSES

401-02 Special Topics in Comparative Literature (3) Content varies. May be repeated. Maximum 9 hrs.
402 Latin American Studies Seminar (3) Selected topics. May be repeated. Maximum 6 hrs.
410-12 Special Topics in Latin American Studies (3, 3) Content varies. May be repeated. Maximum 9 hrs.

Judaic Studies

405 Modern Jewish Thought (3) Same as Religious Studies 405.
425 Early Christian and Byzantine Art, to 1350 (3) Same as Art History 425.
431 Medieval Art of the West, 800-1400 (3) Same as Art History 431.

Latin American Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Linguistics

GRADUATE COURSES

400 Topics in Linguistics (3) Content varies. May be repeated. Maximum 6 hrs.
411 Linguistic Anthropology (3) Same as Anthropology 411.
423 The Development of Diachronic and Synchronic Linguistics (3) Development of Western linguistic thought from the times of the Greeks and Hebrews through modern times. Readings from Boas, Sapir, Bloomfield, and others. Prereq: 9 hrs of course work towards a major or minor in Linguistics, or consent of instructor. F, Sp
424 Introduction to Descriptive Linguistics (3) Same as French 424, German 424, Russian 424, and Spanish 424.
426 Methods of Historical Linguistics (3) Same as German 426, French 426, Russian 426, and Spanish 426.
429 Romance Linguistics (3) Same as French 429 and Spanish 429.
435 Structure of the German Language (3) Same as German 435.
436 History of the German Language (3) Same as German 436.
471 Sociolinguistics (3) Same as English 471 and Sociology 471.
472 American English (3) Same as English 472.
474 Teaching English as a Second or Foreign Language (3) Same as English 474.
475 Teaching English as a Second or Foreign Language (3) Same as English 475.
476 Second Language Acquisition (3) (Same as English 476.)
485 Special Topics in Language (3) (Same as English 485.)
490 Language and Law (3) (Same as English 490.)
510 Special Topics (3) May be repeated. Maximum 6 hrs.

**Medieval Studies**

**GRADUATE COURSES**

510 Special Topics (3) May be repeated. Maximum 6 hrs.

**Urban Studies**

**GRADUATE COURSES**

401 The City in the U.S. (3) (Same as Planning 401.)
441 Urban Geography of the United States (3) (Same as Geography 441.)
464 Urban Ecology (3) (Same as Sociology 464.)

**Women’s Studies**

**GRADUATE COURSES**

400 Topics in Women’s Studies (3) Content varies. May be repeated.
410 Gender Role Development: Implications for Education and Counseling (3) (Same as Counselor Education and Counseling Psychology 410.)
422 Women Writers in Britain (3) (Same as English 422.)
425 Women’s Health (3) (Same as Health 425.)
434 Psychology of Gender (3) (Same as Psychology 434.)
466 Rhetoric of the Woman’s Rights Movement to 1930 (3) (Same as Speech Communication 466.)
469 Sexuality and Cinema (4) Exploration of issues surrounding sexuality, gender and cinema from points of view of feminist film criticism. (Same as Cinema Studies 469.)
476 Rhetoric of the Contemporary Feminist Movement (3) (Same as Speech Communication 476.)
483 African-American Women in American Society (3) (Same as African and African-American Studies 483.)
510 Special Topics (3) May be repeated. Maximum 6 hrs.
593 Independent Study (1-6) Prereq: Consent of Chair of Women’s Studies.

**Journalism**

(Graduate Study in Communications)

**MAJOR DEGREES**

Communications ................. M.S., Ph.D.

James A. Crock, Director

Professors:

Adamsen, June N. (Emeritus), M.S. Tennessee
Ashdown, Paul G., Ph.D. .......... Bowling Green
Bowles, Dorothy, Ph.D. ............ Wisconsin
Cade, Dozier C. (Emeritus), Ph.D. .... Iowa
Caudill, C. Edward, Ph.D. .......... North Carolina
Crock, James A., Ph.D. .......... Iowa State
Everett, George A. (Emeritus), Ph.D. .... Iowa

Haskins, Jack B. (Emeritus), Ph.D. , Minnesota
Lubber, B. Kelly (Emeritus) , Ph.D. .... Southern Illinois
Littmann, Mark (Chair of Excellence), Ph.D. .... Northwestern
Miller, M. Mark, Ph.D. .......... Michigan State
Singletary, Michael W., Ph.D. .... Southern Illinois
Teeter, Dwight L., Jr., Ph.D. .... Wisconsin
Tucker, Willis C. (Emeritus), M.S. ....... Kentucky

Associate Professors:

Dimmick, Susan L., Ph.D. .......... Tennessee
Foley, Daniel, M.S.J. ............... Northwestern
Heller, Robert B., M.A. ............ Syracuse
Morrow, Jerry L., Ph.D. ............. Toledo

Assistant Professor:

White, Candace L., Ph.D. .......... Georgia

The School of Journalism offers a concentration area for the master's with a major in Communications and participates in the interdisciplinary doctoral program. See Communications for additional information.

**Journalism**

**GRADUATE COURSES**

403 International Communications (3) Development and operations of world mass communications channels and agencies. Comparative analysis of media, media practices, and flow of news throughout world. Print and broadcast systems in terms of relevant social, political, economic, and cultural factors. Relation of communication practices to international affairs and understanding.

410 Opinion Writing (3) Analysis of editorial positions, practices, and arguments. Writing of editorials and columns for newspapers, magazines and company publications. Study of the use of rhetoric and logic. Prereq: Editing for Mass Communication or consent of instructor. May be repeated. Maximum 6 hrs.

412 Opinion Writing (3) (Same as Journalism 412.)

416 Issues in Public Relations (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

420 Print Media Management (3) Current business practices among print media, especially newspapers. Problems in management and production and outlook for new technologies. Prereq: 6 hrs mathematics and/or statistics and senior standing. Sp

430 Public Affairs Reporting (3) Reporting and writing about courts, governments, and public agencies. Event and issue-oriented journalism of politics and public affairs. Prereq: Reporting E

433 Advanced Editing (3) Sensitivity to language and editing skills. Headline writing, layout, and production. Prereq: Editing. Sp

444 Journalism as Literature (3) Study of writers from 17th century to modern whose works have endured as both journalism and literature. Emerging genre called literary journalism; means of cultural reporting with personal narrative style. Prereq: Consent of instructor.

450 Writing About Science, Technology, and Medicine (3) Writing workshop to analyze examples of successful science writing and write articles for general public based on scientific journals, news conferences, technical meetings, and interviews. Prereq: Consent of instructor. (Same as Information Sciences 450.)

451 Environmental Reporting (3) Writing for media on such environmental issues as strip-mining, water pollution, air pollution, health hazards, environmental power, and solid wastes. Presentations from and inter-view of experts in environmental science and reporting. Exemplary popular literature in environmental reporting. Prereq: Editing for majors; consent of instructor for non-majors.

455 Issues in Science Communications (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

456 Science Writing as Literature (3) Survey of important science writing for general public across spectrum of science, engineering, and medicine. Works by authors such as Arthur C. Clarke, Stephen J. Gould, and Richard Selzer. Analysis of literary qualities in quest to understand why some science writing succeeds. Prereq: Consent of instructor.


466 Rhetoric of the Woman’s Rights Movement to 1930 (3) (Same as Speech Communication 466.)

485 Special Topics in Language (3) (Same as English 485.)

490 Language and Law (3) (Same as English 490.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

520 Press-Government Relations (3) Development of adversarial relationship between journalists and government officials. Philosophical and legal basis for open government and government openness. Use of press by candidates and incumbents. (Same as Public Relations 520.)

525 Public Opinion (3) Role of press in developing and influencing public consensus. Social theories of public opinion and analysis of mass media’s response. (Same as Public Relations 525.)

535 Publications Management (3) Problems in management, production, market analysis, and design. Techniques of writing, editing, and presenting comprehensive articles and other material, regional and specialized magazines. Individual editorial projects. Prereq: 450 or consent of instructor.

550 Writing and Editing Projects (3) Specialized writing or editing interests: agriculture, politics, labor, finance, science, technical, general publications. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

580 Seminar in Visual Communication (3) Behavioral aspects of communication with images. Theories of psychological effect in color, shape, texture, and other design elements. Prereq: Editing or Advertising Creative Strategy or Electronic Field Production or equivalent.

586 Seminar in Visual Communication (3) Behavioral aspects of communication with images. Theories of psychological effect in color, shape, texture, and other design elements. Prereq: Editing or Advertising Creative Strategy or Electronic Field Production or equivalent.

590 Communications and International Development (3) Relationship between mass communications and development of nations. Role of communications media of developed nations in Third World regions of globe. Communications as facilitator of international cooperation.

597 Independent Study (1-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

598 Internship (3) Professional work in journalism supervised by editor or manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

**Public Relations**

**GRADUATE COURSES**

412 Opinion Writing (3) (Same as Journalism 412.)

416 Issues in Public Relations (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

470 Public Relations Campaigns (3) Research, planning and communication and evaluation of major public relations campaigns. Oral and written presentation of public relations project from inception to completion. Extensive out-class work. Prereq: Public Relations Principles or equivalent. F, Sp

516 Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.

520 Press-Government Relations (3) (Same as Journalism 520.)

525 Public Opinion (3) (Same as Journalism 525.)
Language, Communication, and Humanities Education

(College of Education)

MAJORS

Education...............M.S., Ed.S., Ed.D., Ph.D.

Patricia Davis-Wiley, Leader

Professors:

Christensen, Mark A. (Emeritus), Ph.D. Kansas
Davis-Wiley, Patricia, Ed.D...........Houston
Hull, H. N., Ed.S...........................Peabody
Watkins, J. Paul (Emeritus), M.S.,......Tennessee

Associate Professor:

Hodge, R. L., Ph.D...........................Texas

The Language, Communication, and Humanities Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

- Master of Science
- Education
- Track 1-art education
- Track 1-English education
- Track 1-foreign language/ESL education
- Track 2-art education
- Track 2-secondary teaching
- Educational Specialist
- Education
- English education
- Foreign language/ESL education
- Doctor of Education
- Education
- English/foreign language/ESL education
- Doctor of Philosophy
- Education
- English/foreign language/ESL education

See Education under Fields of Instruction for full description of all degree requirements.

The unit's mission is the preparation of teachers for instruction in art, foreign language, ESL, English, and secondary reading. The emphasis is on how these disciplines are taught in context of different cultures.

Art Education

GRADUATE COURSES

510 History and Philosophy of Art Education (3) United States from 1860's to present. Prereq: Consent of instructor.

520 Studies in Art Education (3) Issues and topics current to the field of art education. Prereq: Consent of instructor.

530 Production and Critical Analysis of Art (3) Relationship of production and critical analysis of works of art to discipline-based art education.

540 Instructional Materials and Production Related to the Teaching of Art (3) Development and use of instructional aids concerned with all aspects of teaching art, video, audio, slides, charts, and learning place.

590 Special Topics in Art Education (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

593 Independent Study (1-3) May be repeated. S/NC or letter grade. E

Language, Communication, and Humanities Education

GRADUATE COURSES

455 Teaching of Foreign Languages, Grades 7-12 (3) Instructional methods, lesson planning, peer-teaching, materials for teaching foreign language and culture; evaluation techniques. Required for certification in modern foreign languages and Latin. Prereq: Completion near completion of foreign language hours for certification and Admission to Teacher Education Program.

459 Teaching English in the Secondary School (3) Techniques of teaching composition, language, and literature. Prereq: Admission to Teacher Education Program.

460 Teaching Reading and Literature in the Secondary School (3) Approaches for teaching basic reading skills and ways of teaching literature. Sp

461 Developing Reading Skills in Content Areas (3) Techniques for teaching reading and study skills in content areas of school program. Extensive assessment of textbooks. Middle school and high school. E

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

502 Registration for Use of Facilities (3-18) Required for the student not otherwise registered during any semester when student uses University facilities and for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E


507 Teaching Poetry Grades 7-12 (3) Research and theory in application to teaching of poetry. Design of strategies and materials for teaching and writing and reading of poetry. Review of texts and materials. F

508 Teaching Composition in the Secondary School (3) Teaching of writing, composition, and argumentation; writing process and marking of student papers. Sp

509 Teaching Fiction in the Secondary School (3) Teaching of novels and short stories. F

510 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E

521 Interdisciplinary Aesthetics (3) Discussions, visual and audio presentations concerned with aesthetic considerations of areas of study: geography, history, physics, literature, languages, music, visual arts and drama.

533 Reading in College Community: Research and Theory (3) Analysis of components of effective community college reading programs. Attention to research and theoretical bases. Prereq: Course in reading education or consent of instructor. Su

555 Foreign Language in the Elementary Schools Practicum (3) Experiences designing, implementing and assessing second language instruction in elementary school setting. Prereq: 557 or consent of instructor.

556 English as a Second Language Practicum (3) Experiences designing, implementing and assessing English instruction to non-native speakers. Required course for ESL certification. Prereq: 557 or consent of instructor.

578 Teaching English as a Second Language (3) Instructional methods; utilization of assessment procedures to diagnose English linguistic proficiency; materials for non-native speaker in K-12 classroom. Required for Tennessee ESL (K-12) license. Prereq: 557 or consent of instructor. Sp

587 Teaching Foreign Languages in Secondary Schools (3) Advanced instructional techniques and evaluation procedures: materials analysis and preparation; trends, issues, and research in modern foreign languages and Latin. Prereq: Consent of instructor. Sp

590 Seminar in Teaching English in Secondary Schools (3) Content varies. Theoretical and practical approaches to teaching English in secondary school. May be repeated. Su

591 Linguistics and the Teaching of English (3) Grammar, usage, semantics, dialectology, history of language, and lexicography. Su

593 Independent Study (1-3) May be repeated. S/NC or letter grade. E

594 Supervised Readings (1-3) May be repeated. S/NC or letter grade. E

595 Special Topics (1-3) May be repeated. S/NC or letter grade. E

597 Teaching Drama Grades 7-13 (3) Strategies and methods for teaching creative drama, including writing and reading of plays. Prereq: Consent of instructor.

598 Developing Speaking and Listening Skills, Grades 7-12 (3) Approaches to nonverbal communication, interpersonal and group communication, public address and listening. Review of tests and materials. Sp

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

601 Studies in English Education (3) Issues and research in teaching of English. Su

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/NC only. E

605 Organizing and Administering Reading Programs (3) Analyzing and synthesizing instructional, learning, and materials components into classroom school and system programs. Prereq: 2,500-level courses in reading education or consent of instructor. Su

678 Advanced Studies in English as a Second Language (3) Research, curricula, assessment, trends and issues in English as a second language. Prereq: 578 or consent of instructor.

687 Advanced Studies in Foreign Language Education (3) Research, curricula, assessment, trends and issues in foreign language education. Prereq: 587 or consent of instructor.

689 Internship (1-3) Experiences in application of principles and practices of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

693 Independent Study (1-3) May be repeated. S/NC or letter grade. E

694 Supervised Reading (1-3) May be repeated. S/NC or letter grade. E

695 Special Topics (1-3) May be repeated. S/NC or letter grade. E

Large Animal Clinical Sciences

See College of Veterinary Medicine and Comparative and Experimental Medicine
Current information regarding admission, financial aid, course requirements, academic policies, extracurricular activities, and student services is available from the Admissions Office. The University of Tennessee, College of Law, 1505 W. Cumberland Ave., Knoxville, Tennessee 37996-1810. Completed application should be received before February 1 of the year of requested admission.

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 88 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 credit hours taken in residence were earned. Averages are computed on weighted grades. Grades are on an alphabetical scale from A to F. No credit toward the J.D. degree is awarded for grades of D- or F.

Eligible law students may receive up to six (6) semester hours of credit toward the J.D. degree for acceptable performance in upper-level courses that materially contribute to the study of law and which are taken in other departments at The University of Tennessee. 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 toward a graduate degree in the department offering the course. Refer to the Law Catalog and Student Handbook for current degree requirements.

Concentration in Business Transactions

Students interested in a concentration in business transactions must complete all of the following law courses:

818 Fundamental Concepts of Income Taxation
826 Introduction to Business Transactions
827 Business Associations
972 Income Taxation of Business Organizations
940 Land Finance Law
840 Corporate Law
642 Contract Drafting Seminar
833 Corporate Finance

None of the above courses may be taken on an S/NC basis (with the exception of 826).

*This course is not required for students who have an undergraduate major in accounting, finance, or business administration, who hold the MBA degree, or who are enrolled in the dual J.D.-MBA program.

Waivers may also be granted to students who have acquired the requisite knowledge through other coursework or through practical experience.

Concentration in Advocacy and Dispute Resolution

Students interested in a concentration in advocacy and dispute resolution must complete all of the following courses:

813 Evidence
815 Introduction to Advocacy and Professional Responsibility
905 Advocacy Clinic
920 Trial Practice
921 Pretrial Litigation

*This course is not required for students who have an undergraduate major in accounting, finance, or business administration, who hold the MBA degree, or who are enrolled in the dual J.D.-MBA program.

Waivers may also be granted to students who have acquired the requisite knowledge through other coursework or through practical experience.

Concentration in Advocacy and Dispute Resolution

Students interested in a concentration in advocacy and dispute resolution must complete all of the following courses:

813 Evidence
815 Introduction to Advocacy and Professional Responsibility
905 Advocacy Clinic
920 Trial Practice
921 Pretrial Litigation

922 Advanced Trial Advocacy
928 Case Development and Resolution

Students electing a concentration in advocacy and dispute resolution may not take any of the above courses on an S/NC basis.

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 conferred on both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take fewer hours of coursework than would be required if the two degrees were to be earned separately.

Admissions

Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and The Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may 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 hours required for the J.D. degree and the last 16 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 toward graduation from either college for courses in the other college, except as such courses qualify for credit without 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 a maximum of nine (9) semester hours toward the J.D. degree for acceptable performance in approved graduate-level courses offered by the College of Business Administration. Three of the 9 semester hours must be earned in Accounting 501, 503, or a more advanced accounting course.

The College of Business Administration will award credit toward the MBA for acceptable performance in a maximum of 9 semester hours of approved courses offered by the College of Law.

Except while completing the first year courses in the College of Law, students are encouraged to maximize the integrative facets of the dual program by taking courses in both colleges each year.

Awarding of Grades

For grade recording purposes in the College of Law for graduate 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
TAKING LAW COURSES

Students pursuing a graduate degree in another college may, upon approval of the College of Law and the major chairperson, take up to 6 semester hours of law courses and receive credit toward the graduate degree. The graduate student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. If a C or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a C, an NC will be recorded, and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average. Law courses may be taken for credit only by students enrolled in a graduate degree program.

POLICY FOR GRADUATE STUDENTS

DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years otherwise required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area without the approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of C- or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University will 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 taken in other departments of the University except for those taken in conjunction with the dual program.

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.

PROFESSIONAL COURSES

801 Civil Procedure I (3) Binding effect of judgments, selecting proper court (jurisdiction and venue), ascertaining applicable law, and federal and state practice.


803 Contracts I (3) Basic agreement process and legal protections afforded contracts: offer and acceptance, consideration and other bases for enforcing promises; The Statute of Frauds, unenforceability and other controls of promissory estoppel. Introduction to pertinent portions of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I. Issues arising after contract formation: interpretation, duties of good faith, conditions, impracticability and frustration of purpose; remedies; third party beneficiaries; assignment and delegation. Considerable coverage of Article 2 of the Uniform Commercial Code with respect to remedies, assignability, repudiation, impracticability and good faith.

805 Legal Process I (3) Lawyer-like use of cases and statutes in prediction and persuasion. Analysis and synthesis of common law decisions; statutory interpretation; fundamentals of expository legal writing and legal research.

806 Legal Process II (3) Continuation of Legal Process I. Formal legal writing, appellate procedure, and oral advocacy.

807 Torts I (3) Intentional torts, defenses and privileges related to intentional torts: negligence: standard of care, professional malpractice, and liability of owners and occupiers of land; defenses based on plaintiff's conduct; contributory and comparative negligence, assumption of risk, failure to take precautions, and avoidable consequences; causation, proximate cause; duty rules, and questions of joint and several or liability.

808 Torts II (3) Vicarious liability and related concepts; strict liability for dangerous animals and abnormally dangerous activities; products liability; nuisance, defamation; invasion of privacy; economic torts; misrepresentation and interference with contract and prospective opportunities; immunity of those government, governmental employees, charities and family members in damages.

809 Criminal Law (3) Substantive aspects of criminal law: general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crimes.

810 Property (4) Introductory course treating issues of ownership, possession, and control in the areas of landlord-tenant relations; estates in land and future interests; co-ownership and marital property; real estate sales agreements; types of conveyances; title assurance; recording statutes; servitudes; and selected aspects of nuisance law, eminent domain and zoning.

812 Constitutional Law (4) Fundamental principles of American constitutional law; federalism, separation of powers, equal protection of law, and constitutional protection of other fundamental individual rights.

813 Evidence (4) Rules regulating introduction and exclusion of oral and demonstrative evidence at trial and other proceedings, including relevance, competency, impeachment hearsay, privilege, expert testimony, authentication, and judicial notice. Coreq: 920 for students electing concentration in advocacy.

814 Legal Profession (3) Legal, professional and ethical standards applicable to lawyers. Not open to students who have taken 815.

815 Introduction to Advocacy and Professional Responsibility (3) Theory and morality of advocacy in adversarial system, and legal, ethical, and professional standards applicable to lawyers and especially lawyers as advocates.

818 Fundamental Concepts of Income Taxation (3) Introduction to basic statutory analysis, fundamental principles of federal individual income tax, and pervasive income tax considerations that arise in practice. Federal concept of gross income, patten of exclusions, exemptions, and deductions from gross income used to arrive at
929 Teaching Clients the Law (3) Communication of law as basis for decision by persons other than lawyers. Development of skills in advising clients and by writing research papers that synthesize Tennessee or federal law in plain language.

935 Gratuities (2) Nature, creation, termination, and modification of gifts; voluntary obligations of courts; terminology of gifts; construction of various types of testamentary and other gifts; imposition of limitations; application of the rule against perpetuities.


940 Land Finance Law (3) Financing devices: mortgages, deeds of trust and land contracts; problems of priorities; transfer of secured interests when mortgagor assumes or loan subject to security interest; default, exercise of equity of redemption; and/or statutory right of redemption; mechanics and priorities in land mortgages. Prereq: 818.

945 Tax Theory (3) Method and purposes of governmental revenue collection through examination of economic and political aspects of tax systems; comparative analysis of various actual and proposed systems; methods of taxation; income tax; consumption tax; sales tax; and value-added tax. Required preparation of written paper on a topic of tax theory chosen by student. Limited enrollment. Prereq: 935.

972 Income Tax II (3) Corporate reorganizations and distributions; transactions among corporations and shareholders. Prereq: 818.

973 Wealth Transfer Taxation (3) Taxation of gratuitous transfers of wealth during lifetime (gift tax) and at death (estate tax) and of generation-skipping transfers. Prereq or coreq 935.

975 Tax Theory (3) Method and purposes of governmental revenue collection through examination of economic and political aspects of tax systems; comparative analysis of various actual and proposed systems; methods of taxation; income tax; consumption tax; sales tax; and value-added tax. Required preparation of written paper on a topic of tax theory chosen by student. Limited enrollment. Prereq: 935.

976 Tax Theory (3) Method and purposes of governmental revenue collection through examination of economic and political aspects of tax systems; comparative analysis of various actual and proposed systems; methods of taxation; income tax; consumption tax; sales tax; and value-added tax. Required preparation of written paper on a topic of tax theory chosen by student. Limited enrollment. Prereq: 935.
**Educational Administration and Supervision**

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>513</td>
<td>Administrative and Organizational Theory in Education</td>
<td>3</td>
<td></td>
<td>F, Su</td>
</tr>
<tr>
<td>515</td>
<td>Human Relations and Communication in Administration</td>
<td>3</td>
<td></td>
<td>F, Su</td>
</tr>
<tr>
<td>516</td>
<td>Research for School Administrators</td>
<td>3</td>
<td>Descriptive and experimental designs to help students without qualitative backgrounds to read and understand technical professional literature. Introduction to interinstitutional needs, assessments, and evaluation procedures.</td>
<td>F, Su</td>
</tr>
<tr>
<td>520</td>
<td>Politics of Education and Educational Environments</td>
<td>3</td>
<td>School/community roles in political context of modern, complex society. Administrator and supervisory competencies: political, social, ethical, cultural, and racial environments in which administrators operate.</td>
<td>F, Su</td>
</tr>
<tr>
<td>535</td>
<td>Administrative Applications of Micro Computers</td>
<td>3</td>
<td>DOS, word processing, database management, spreadsheet, and computer communications. Review and development of specific administrative applications: scheduling, attendance, student record systems, and accounting.</td>
<td>F, Su</td>
</tr>
<tr>
<td>544</td>
<td>School Finance and Business Management</td>
<td>3</td>
<td>For prospective building level administrators. Financial and logical management tasks and procedures in individual school setting. Prereq: M.S. introductory core or consent of instructor.</td>
<td>F, Su</td>
</tr>
<tr>
<td>547</td>
<td>Educational Facility Planning</td>
<td>3</td>
<td>Concepts and skills for development, evaluation, construction, renovation, maintenance, and operations of quality educational environments and facilities. Prereq: M.S. introductory core or consent of instructor.</td>
<td>F, Su</td>
</tr>
<tr>
<td>548</td>
<td>Introductory Supervision and Personnel</td>
<td>3</td>
<td>Basic supervisory and personnel concepts and related competencies: building an effective organization (level interviewing, personnel planning, collecting and maintaining employee information, supervision of instructional and non-instructional personnel, clinical supervision, staff evaluation, and staff development. Prereq: Introductory M.S. core or consent of instructor.</td>
<td>F, Su</td>
</tr>
<tr>
<td>553</td>
<td>Strategies of Educational Planning</td>
<td>3</td>
<td>Processes for improving decision-making function through use of both quantitative and qualitative planning techniques. Policy analysis, CPM, Pert, Delphi. Prereq: Introductory M.S. core or consent of instructor.</td>
<td>F, Su</td>
</tr>
<tr>
<td>554</td>
<td>School Law</td>
<td>3</td>
<td>Logical arrangement of case and statutory material for public school administrators and teachers; problems concerning law and public education. Prereq: M.S. introductory core or consent of instructor.</td>
<td>F, Su</td>
</tr>
<tr>
<td>558</td>
<td>Internship in Educational Administration</td>
<td>3</td>
<td>Field experience in appropriate educational setting working directly with administrator. At end of planned program of study, Placement by department assignment. Some on-campus classes in conjunction with 583 or 582. Prereq: 21 hrs. in educational administration and supervision or consent of instructor.</td>
<td>F, Su</td>
</tr>
<tr>
<td>583</td>
<td>Educational Leadership—Principals</td>
<td>3</td>
<td>Knowledge, skills and relationships for principal to be effective educational leader. Application of material and field-based activities. Culminating in supervised principalship at end of planned course of study. Prereq: 21 hours in educational administration and supervision or consent of instructor.</td>
<td>F, Su</td>
</tr>
<tr>
<td>590</td>
<td>Special Topics</td>
<td>(1-3)</td>
<td>May be repeated.</td>
<td>E</td>
</tr>
</tbody>
</table>

**Higher Education**

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>530</td>
<td>Special Topics</td>
<td>(1-3)</td>
<td>May be repeated.</td>
<td>E</td>
</tr>
<tr>
<td>534</td>
<td>Program Evaluation in Education</td>
<td>3</td>
<td>Same as Education in the Sciences, Mathematics, Research and Technology 535.</td>
<td></td>
</tr>
<tr>
<td>536</td>
<td>Seminar on Policy Issues in Quality Assurance</td>
<td>3</td>
<td>Exploration of historic and contemporary approaches to definition and demonstration of quality in higher education and examination of contemporary policy issues related to quality assurance in colleges and universities.</td>
<td></td>
</tr>
<tr>
<td>537</td>
<td>Student Assessment in Higher Education</td>
<td>3</td>
<td>Outcome assessment in American higher education: origins of assessment policies, rationales for assessment policy and practice, constructs and outcomes typically assessed, methods for conducting assessment, and uses of assessment data. Philosophies, priorities, and values, recent assessment efforts in higher education.</td>
<td></td>
</tr>
<tr>
<td>542</td>
<td>The College Student and the Court</td>
<td>3</td>
<td>Legal precedent affecting student personnel services in public higher education. Student discipline, housing, dress, organization, activities fees, tuition and related federal regulations.</td>
<td>F</td>
</tr>
<tr>
<td>543</td>
<td>American Higher Education in Transition</td>
<td>3</td>
<td>Historical, philosophical and organizational perspective. Functional areas comprising field and major issues.</td>
<td>F</td>
</tr>
<tr>
<td>547</td>
<td>Theory and Practice in Student Personnel Services</td>
<td>3</td>
<td>Theoretical framework of student personnel services and practical application of theory in student personnel environment. Applicable administrative theory, human development theory and evaluation assessment techniques.</td>
<td>Sp</td>
</tr>
<tr>
<td>559</td>
<td>Practicum in College Student Personnel</td>
<td>(1-6)</td>
<td>Prepr. Consent of instructor. May be repeated. S/N only.</td>
<td>E</td>
</tr>
<tr>
<td>561</td>
<td>Administration and Governance in Higher Education</td>
<td>3</td>
<td>Trends, structure and process of collegiate governance. Development of understanding of administrative theory and practice in higher education. Prereq: 543 or consent of instructor.</td>
<td>F</td>
</tr>
<tr>
<td>630</td>
<td>Special Topics</td>
<td>(1-3)</td>
<td>May be repeated.</td>
<td>E</td>
</tr>
<tr>
<td>640</td>
<td>College and University Law</td>
<td>3</td>
<td>Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty tenure, sexual orientation, religion, tort liability, academic freedom, academic due process and affirmative action in employment.</td>
<td>F</td>
</tr>
<tr>
<td>645</td>
<td>Curriculum and Instruction in Undergraduate Higher Education</td>
<td>3</td>
<td>Content and organization of institutional strategies and curricular structure in higher education.</td>
<td>F, Su</td>
</tr>
<tr>
<td>650</td>
<td>Fiscal Problems in Higher Education</td>
<td>3</td>
<td>Revenue sources, appropriation process, budget procedures, cost analysis, and fiscal management in public and independent colleges and universities.</td>
<td>Sp</td>
</tr>
<tr>
<td>670</td>
<td>Values and Ethics in Educational Leadership</td>
<td>3</td>
<td>Same as Educational Administration and Supervision 670.</td>
<td></td>
</tr>
<tr>
<td>695</td>
<td>Practicum in Higher Education</td>
<td>(1-9)</td>
<td>Supervised practicum in selected areas of higher education administration; Prepr. Consent of instructor. May be repeated. S/N only.</td>
<td>E</td>
</tr>
<tr>
<td>698</td>
<td>Seminar in Higher Education</td>
<td>3</td>
<td>Capstone experience for doctoral students. Examination of major philosophical concepts and policy principles distinctive to American higher education, review of significant and current policy reports and issues, exploration of contemporary policy issues, and evaluation of readjustments in higher education.</td>
<td>Travel to state, regional, and national policy agencies for higher education.</td>
</tr>
</tbody>
</table>
Leadership Studies

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for any semester before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Problems in Lieu of Thesis (2-5) May be repeated. Maximum 9 hrs. S/NC only. E
518 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E
593 Independent Study (1-3) May be repeated. S/NC or letter grade. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E
606 Leadership Forum (2) Development of research, evaluation, policy analysis skills and critical analysis and evaluation of philosophical principles underlying American education. Continuous enrollment for 2 years, on-campus, for students in Ed.D. alternative residence program. May be repeated. Maximum 12 hrs. S/NC only.
612 Modes of Inquiry in Educational Research (3) Various inquiry approaches to research in education: related philosophical, methodological and ethical considerations in research design and use of research findings. (Same as Psychological Studies 612.) E
693 Independent Study (1-3) May be repeated. S/NC or letter grade. E

Life Sciences
(Join College of Arts and Sciences)

MAJOR DEGREES

Life Sciences ................................ M.S., Ph.D.

W.F. Harris, Chair

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdisciplinary and are designed to augment offerings of individual departments in the following concentrations: biotechnology, (M.S. only), and plant physiology and genetics. Students interested in these areas should contact either the Life Sciences chairperson or the director of the area of interest. Each program is overseen by a committee and may have unique admission requirements.

ADMISSION REQUIREMENTS

1. A Bachelor's degree with a major in a biological, behavioral, or physical science.
2. GRE (general) scores.
3. Three letters of recommendation.
4. Coursework 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.

DEGREE REQUIREMENTS

The master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. Within the biotechnology program only, a non-thesis M.S. option is available. Students choosing this option are expected to complete: (1) two summers' co-op experience in an appropriate industry. An evaluation by supervisor and a written report are required

(529, Biotechnology Practicum Cooperative Experience, maximum 4 hrs.); (2) A written report in the form of a scientific paper in an area of specialization chosen by the student and advisor. The minimum requirements for the doctoral degree include 72 semester hours above the 600 level, 24 semester hours of course 600, a pattern of courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a defense of dissertation. Individual programs may have additional requirements.

CONCENTRATIONS

Biotechnology (M.S. only)

The biotechnology program will prepare students to participate in the wide variety of opportunities presented by the use of living cells and their components for the production of useful materials. This will be achieved at the M.S. level by a prescribed course of study of the biology and biochemistry of cells and molecules; by formal study of cells and of engineering aspects of biotechnology; and by the development of special expertise in areas such as animal embryo manipulation, automated chemical synthesis of macro-molecules, bioprocess engineering, bioproducts and biotransformations, liposomes, microscopy and image processing, monoclonal antibodies and hybridoma technology, plant tissue culture, recombinant DNA technology and risk assessment, and modeling. The production of a research thesis or an industrial co-op experience plus an area of specialization will also be an important part of the training experience.

Required courses are Life Sciences 509, 511, 512, 531, 532; Biochemistry and Cellular and Molecular Biology 511; Microbiology 410; Botany 451; Chemical Engineering 475; and Ecology and Evolutionary Biology 507.

Plant Physiology and Genetics

This program provides the opportunity for intensive training and research experience in areas transgressing the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of physiology and genetics in applied and fundamental aspects of plant science.

Required courses are Life Sciences 510; Botany 521, 522; Biochemistry and Cellular and Molecular Biology 511, 512; Plant and Soil Science 471 or Ecology and Evolutionary Biology 560, Plant and Soil Science 552; Microbiology 410.

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for any semester before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
509 Biotechnology Seminar (1-2) Topics of importance to biotechnology. May be repeated. Maximum 6 hrs.
510 Special Topics in Life Sciences (1-3) Specializations in biotechnology, cellular, molecular, and developmental biology; environmental toxicology; ecology; plant, physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.
511 Advanced Cellular Biology (3) Cell structures and functions at molecular and supramolecular level. Membrane structure, function, and biogenesis; cellular communication; receptors and membrane flow; growth regulation and oncogenes; plant cell structure and function; controllability and motility; mitosis and meiosis; blood and immune cells.
512 Advanced Molecular Biology (4) (Same as Biochemistry and Cellular Molecular Biology 512.)
525 Research Practicum in Life Sciences (1-3) Individual sections for each of biotechnology, cellular, molecular and developmental biology; environmental toxicology; ecology; plant physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.
529 Biotechnology Practicum Co-operative Experience (2) Work experience in commercial organization for students undertaking non-thesis option of biotechnology concentration. May be repeated. Maximum 4 hrs.
531 Biotechnology Laboratory (3) Growth of microorganisms, analysis of extracellular and intracellular components.
532 Biotechnology Laboratory (3) Pilot scale yeast cultivation, enzyme isolation, purification and characterization. Application of purified enzymes to food production fermentation and fermentation control.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
610 Advanced Topics in Life Sciences (1-3) Topics vary. May be repeated. Maximum 6 hrs.

LOGISTICS

See Marketing, Logistics, and Transportation

Management
(Join College of Business Administration)

MAJOR DEGREES

Business Administration ............. MBA, Ph.D.

Oscar Fowler, Head

Professors:

Boling, Ronald W. (Emeritus), Ph.D. ...., Stanford
Dewhirst, H. Dudley, Ph.D. ............... Texas
Gilbert, Kenneth C., Ph.D. ......... Tennessee
Hake, David A., Ph.D. ........ Tennessee
James, Lawrence R. (Pilot Chair of Excellence), Ph.D. ........ Utah
Keally, A. H. (Emeritus), MBA Pennsylvania
Ladd, Robert T., Ph.D. .......... Georgia
Larsen, John M., Jr. (Emeritus), Ph.D. ....... Michigan
Miller, Alex (W.B. Stokely Prof.), Ph.D. ........... Pennsylvania
Rush, Michael C., Ph.D. ........ Iowa
Seals, Donald H., Ph.D. ......... Akron
Srinivasan, M. M., Ph.D. ....... Northwestern Stahl, Michael J., Ph.D. ........... Pennsylvania
Vance, S. C. (Emeritus) (W.B. Stokely Prof.), Ph.D. ....... Pennsylvania
Wagoner, George A. (Emeritus), M.S. ........ Indiana
Whitlock, G. H. (Emeritus) (Distinguished Prof.), Ph.D. ............... Tennessee

Associate Professors:

Bowers, Melissa R., Ph.D. ................. Clemson
Erdingeh, Chanaka P., Ph.D. British Columbia
Fowler, Oscar S., Ph.D. .................. George
Judge, William Q., Ph.D. ........ North Carolina
Maddox, Robert C., Ph.D. ........ Texas
Assistant Professor: Cleftland, Iain J., Ph.D. Southern California

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA and Ph.D. program requirements, see Business Administration.


Minimum course requirements for management--Three courses from the following: 511, 521, 522, 531, 541, 542, 551, 571, 581, 593, Business Administration 510, 559. Selection must be approved by the Management Department MBA advisor. For forest industries management--511, Foresty 560, 565. For environmental management: 581 plus two approved courses from the following list: Ecology and Evolutionary Biology 520, 555; Environmental Engineering 510, 555, 556; Chemical Engineering 581; Economics 677, 678; Agricultural Economics 570; Sociology 560, 665; Law 866, 887; Geography 577. For manufacturing management--541, 542, Management Science 526, and an Industrial Engineering/Management Science course approved by designated faculty. Industrial Engineering 524 or Management Science 541 are recommended. Additional courses may be accepted subject to approval by Management Department Chairperson or designated faculty.

Ph.D. Concentration: Management.

Minimum course requirements are: For operations management-- 541 and 542; two semesters of 640 (may be repeated for credit); one additional semester of approved doctoral seminar work. For strategic management--610, 611, 612, 613.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

GRADUATE COURSES

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

511 Organizational Theory: Integrated Structure and Behavior (3) Classes, group projects, discussion; organizational theories, organizational effectiveness, contextual factors of organizations: environment, size, technology; organizational structure configurations, organization design, social influences on organization effectiveness: motivation, leadership, group behavior, intergroup relations, organization change and development.

521 Personnel Administration (3) Personnel functions and human resource management. Community relations, recruiting, selection, training, performance evaluation, wage and salary administration, legal framework as it affects personnel.

531 Management of Technology-Based Organizations (3) Role of technology and innovation in formulation and implementation of strategy. Management of research and development function and coordination with other functions. Management of scientists and engineers.

541 Operations Management (3) Operations applicable to design of systems in operations function.

542 Operations Management II (3) Operations planning and control function. Application of models to real-world systems.

551 Management of New Ventures (3) Integration of various functional disciplines and their application to general management of ventures formed within larger corporations and independently. Preparation of a venture plan and case analyses.

571 International Management (3) Analysis of environment of international business firms and impact of internal and external factors on managerial decisions.

581 Environmental Management (3) Management framework for addressing environmental issues. Most pressing environmental challenges; options compatible with sustained business performance. Cases, field projects, research papers.

593 Directed Independent Study (1-3) Topic of mutual interest. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 8 hrs. S/NC or letter grade.

595 Selected Topics in Current Management Issues (3) In-depth consideration of current issues. Managerial impact of emerging topics. Prerequisites: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Prerequisite: Consent of instructor.

601 Research Methods (3) Seminar covering broad range of issues: research process as applied to study of strategic management. Literature and examples of research proposal.

610 Seminar in Advanced Organization Theory (3) Analysis of functioning of complex organizations. Class and open systems models, organizational growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management I (3) Analysis of concepts and research in strategic management.

612 Seminar in Strategic Management II (3) Analysis of concepts and research in strategic management.

613 Seminar in Strategic Management III (3) Review and analysis of important books and monographs in strategic management. Understanding evolution of thought and emergence of distinct paradigms.

Management Science

(College of Business Administration)

MAJORS DEGREES

Management Science .................... M.S., Ph.D.

M. M. Srinivasan, Chairperson

Committee Members:

Bowers, Melissa R., Management; Bozdogan, Hampurums, Statistics; Edison, Chana F.; Management; Fowler, Oscar S.; Management; Gilbert, Kenneth C.; Management; Leitnaker, Mary G.; Statistics; Noon, Charles E.; Management; Raitson, Bruce A.; Geography.

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 coursework will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires concentrated study in a supporting area.

Supporting areas are available in other departments of the College of Business Administration as well as in computer science, public administration, geography, health, and other areas, subject to approval by the Management Science Committee.

Admission Requirements

The master's program requires three applicant recommendation forms and the GRE or GMAT. Applications are encouraged from all majors, but a mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language is required. The program is designed to be completed in four semesters by full-time students. However, students may start the program in any semester and may pursue an M.S. degree program in Management Science on a part-time basis.

Course Requirements

HOURS

Core Requirements: Management Science 531, 532, 553, 554, and 691 or 692 Statistics 563

Applied specialization area (approved by advisor) 9

Technical elective: Statistics (500 level or above as approved by advisor) 6

Mathematics (400 level or above as approved by advisor) 9

Industrial Engineering (400 level or above as approved by advisor) 6

Other elective as approved by advisor 3

Electives selected from mathematics, statistics, computer science, business, management science, industrial engineering, or other approved area 9

Total 40

A thesis option is available to qualified students. 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 semester and must approve all courses on a semester-by-semester 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. The total course load will remain 40 hours for all students.

THE DOCTORAL PROGRAM

The Ph.D. program in Management Science is designed to prepare students for research related 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, management, engineering, and transportation and logistics) or other disciplines. Students will demonstrate mathematical maturity to enhance potential career development.

Admission Requirements

The doctoral program requires three applicant recommendation forms and the GRE or GMAT, in addition to the Graduate School's requirements.

Coursework

A minimum of 48 semester hours of coursework taken for graduate credit (exclusive of thesis or dissertation) is required. Some of this may be the coursework from a master's program; however, a master's is not a prerequisite for the doctorate. The candidate must complete a minimum of 24 semester hours at The University of Tennessee, Knoxville, at least 8 of which must be the 600 level. Both of these requirements are also exclusive of those of dissertation credits. 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 16 to 20 semester hours of coursework in the applied area.

Qualifying Examinations

The student must demonstrate mastery of probability theory and statistical inference, Statistics 563, 564, by passing a written qualifying examination. Mastery of 12 to 14 semester hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis, either Mathematics 471, 472, 453, and 571, or 571-572, and real analysis. Mathematics 445-446. Other options may be approved. In exceptional circumstances, the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

These requirements generally are 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 24 semester hours of Management Science 600: 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 48 hours of coursework, normally is completed in the third year of the program.

ACADEMIC STANDARDS

A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester’s coursework as established by the degree program for full-time students and the next two semester’s coursework as established by the degree program for part-time students.

PREREQUISITES FOR MANAGEMENT SCIENCE COURSES

The 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 coursework does not match the prerequisites are encouraged to seek the instructor’s guidance and consent to enroll.

GRADUATE COURSES

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SNC only. E

526 Systems Modeling and Simulation (3) (Same as Industrial Engineering 523.)

531 Mathematical Programming (3) Linear programming solution procedures, duality, sensitivity, and parametric analysis, linear-fractional, piecewise-linear, separable and integer programming, transportation linear programs. Prerequisites: Fundamentals of matrix algebra. (Same as Industrial Engineering 523.)

532 Stochastic Models in Management Science (3) Discrete-time Markov chains, Poisson processes, continuous-time Markov chains, renewal theory, and queuing theory. Prerequisites: Statistics 563 and Mathematical Analysis or consent of instructor. (S)

533 Computational Mathematical Programming (3) Computational aspects of mathematical programming models, in particular for large systems. Prerequisites: 531 and proficiency in computer language.

534 Management Science Methods in Business (3) Application of methods from 531, 532, and 533 to real world problems in business and industry.

593 Management Science Problems (1-6) Directed study on subject of mutual interest. E

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

621 Network Flows (3) Treatment of network optimization algorithms, transportation and transshipment models and primal-dual and primal-dual based methods. Prerequisite: 531 or equivalent.

631 Integer Programming (3) Theoretical and computational aspects of linear programming, integer programming, branch and bound, cutting plane, and group theoretic algorithms. Prerequisite: 531 or equivalent.

651 Nonlinear Optimization (3) Kuhn-Tucker theory in nonlinear programming, solution procedures for constrained and unconstrained nonlinear problems, search techniques, quadratic programming, duality and sensitiv-

Marketing, Logistics and Transportation

College of Business Administration

MAJOR DEGREES

Business Administration MBA, Ph.D.

Richard C. Reizenstein, Acting Head

Professors:

Bernaby, D. J., Ph.D. .................... Purdue
Cadotte, E. R., Ph.D. ..................... Ohio State
Davis, F. W., Jr., Ph.D. .................. Michigan State
Dicer, G. N., DBA ......................... Indiana
Hendrix, F. L. (Emeritus), Ph.D. ....... North Carolina
Langley, C. J. (Dove Prof.), Jr., Ph.D. .... Penn State
Mentzer, J. T. (Harry J. Bruce Chair of Excellence), Ph.D. .............. Michigan State
Mundy, R. A. (Taylor Prof.), Ph.D. ...... Penn State
Schumann, D. W., Ph.D. ................. Missouri
Woodruff, R. B. (Profitel's Prof.), DBA .... Indiana

Associate Professors:

Dabholkar, P. A. (Liaison), Ph.D. Georgia State
Foggin, J. H. (Liaison), DBA ............... Indiana
Gardial, S. F., Ph.D. ....................... Houston
Holcomb, M. C., Ph.D. .................... Tennessee
Reizenstein, R. C., Ph.D. ................. Cornell
Renz, J. O., Ph.D. ......................... Georgia

Assistant Professors:

Moon, M. A., Ph.D. .............. North Carolina
Norek, C. D., Ph.D. ....................... Ohio State

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA and Ph.D. program requirements, see Business Administration.

MBA Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—501, 508, and one course from the following: 504, 506, 507, 593, and 599. For marketing—511 and 512.

Ph.D. Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—12 hours to include 612, 614, 615. For marketing—12 hours from among the following courses: 601, 612, 614, 615, 617.

754 Theory of Probability and Statistics (3-15) P/NP only. E

691 Special Topics (3) Prerequisite: 531, 532 and consent of instructor. May be repeated. Maximum 9 hrs.

691-92 Management Science Seminar (1,1) Subjects selected from current literature. S/NC only.

DEGREES

Business Administration MBA, Ph.D.

Richard C. Reizenstein, Acting Head

Professors:

Bernaby, D. J., Ph.D. .................... Purdue
Cadotte, E. R., Ph.D. ..................... Ohio State
Davis, F. W., Jr., Ph.D. .................. Michigan State
Dicer, G. N., DBA ......................... Indiana
Hendrix, F. L. (Emeritus), Ph.D. ....... North Carolina
Langley, C. J. (Dove Prof.), Jr., Ph.D. .... Penn State
Mentzer, J. T. (Harry J. Bruce Chair of Excellence), Ph.D. .............. Michigan State
Mundy, R. A. (Taylor Prof.), Ph.D. ...... Penn State
Schumann, D. W., Ph.D. ................. Missouri
Woodruff, R. B. (Profitel's Prof.), DBA .... Indiana

Associate Professors:

Dabholkar, P. A. (Liaison), Ph.D. Georgia State
Foggin, J. H. (Liaison), DBA ............... Indiana
Gardial, S. F., Ph.D. ....................... Houston
Holcomb, M. C., Ph.D. .................... Tennessee
Reizenstein, R. C., Ph.D. ................. Cornell
Renz, J. O., Ph.D. ......................... Georgia

Assistant Professors:

Moon, M. A., Ph.D. .............. North Carolina
Norek, C. D., Ph.D. ....................... Ohio State

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA and Ph.D. program requirements, see Business Administration.

MBA Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—501, 508, and one course from the following: 504, 506, 507, 593, and 599. For marketing—511 and 512.

Ph.D. Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—12 hours to include 612, 614, 615. For marketing—12 hours from among the following courses: 601, 612, 614, 615, 617.
Logistics and Transportation

GRADUATE COURSES

501 Survey of Logistics and Transportation (3) U.S. logistics and transportation: physical, economic, social, and political environment; financing, managing, maintaining, and enhancing U.S. transport infrastructure.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

504 Freight Carrier Systems and Management (3) Analysis of freight carrier management's efforts to provide services demanded by consumers in logistics and transportation marketplace.

506 Logistics Systems Management (3) Development of strategy for management of logistics systems. Executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through case approach and simulation game.

507 International Logistics and Transportation (3) Logistics strategy in the international firm: materials management, international sources and destination, and import/exporting issues. International carrier management and operational and comparative national transport systems analysis.

508 Executive-In-Residence Seminar in Logistics and Transportation Strategy (3) Capstone, integrative case course in logistics and transportation strategy: participation in Executive-in-Residence Program that provides student interaction with top-level logistics and transportation executives.

593 Independent Study (3-15) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 6 hrs.

599 Special Topics Seminar (3) Topics vary: marketing forecasting, market segmentation, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

611 Seminar in Theoretical Foundations (3) (Same as Marketing 611.)

612 Research Methods I (3) (Same as Marketing 612.)

614 Seminar in Evolution of Logistics Thought (3) Traces evolution of logistics and transportation thought; dynamic development of principles and tools developed as organizational missions and environmental change. Economic and policy issues peculiar to transportation and other service organizations.

615 Seminar in Logistics and Transportation Models (3) Analysis of contemporary models and methodologies in logistics and transportation research, topical coverage at discretion of instructor.

693 Independent Study (1-12) Directed research on subject of mutual interest to student and faculty. May be repeated. Prereq: Consent of instructor.

511 MBA Marketing Concentration II (6) Determination of customer value. Principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 and 505 or consent of instructor.

512 MBA Marketing Concentration II (3) Delivery of customer value. Communication of customer value, marketing strategies, and providing customer responsive organizations. Prereq: Business Administration 504 and 505 or consent of instructor.

611 Seminar in Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophy of science perspectives. (Same as Logistics and Transportation 611.)

612 Research Methods I (3) Research process: philosophical foundations, problem formulation, grounded theory, qualitative methods and analysis, measurement, sources of error, experimental design and analysis, and survey design and analysis. (Same as Logistics and Transportation 612.)

613 Research Methods II (3) Practical application of data analysis techniques. Experience with sophisticated statistical techniques, using real marketing databases.

615 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, determine state of research in each area, and identify areas that merit further study.

615 Seminar in Buyer Behavior Research (3) Theoretical perspective and research processes describing people in their roles as buyers, users, and evaluators of goods and services. Important research issues and practical applications related to buyer behavior.

616 Measurement (3) Measurement and measurement process: design and development of tools, process of testing, and determination of reliability and validity.

617 Special Topics (3) Topics vary: marketing strategy, advanced consumer behavior, influence and persuasion theory and strategy, pricing issues, international marketing issues, and nonprofit organization marketing issues.

693 Independent Study (1-4) Directed research on subject of mutual interest to student and staff member. May be repeated.

611 MBA Marketing Concentration II (6) Determination of customer value. Principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 and 505 or consent of instructor.

511 MBA Marketing Concentration II (3) Delivery of customer value. Communication of customer value, marketing strategies, and providing customer responsive organizations. Prereq: Business Administration 504 and 505 or consent of instructor.

512 MBA Marketing Concentration II (3) Delivery of customer value. Communication of customer value, marketing strategies, and providing customer responsive organizations. Prereq: Business Administration 504 and 505 or consent of instructor.

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617 Special Topics (3) Topics vary: marketing strategy, advanced consumer behavior, influence and persuasion theory and strategy, pricing issues, international marketing issues, and nonprofit organization marketing issues.

693 Independent Study (1-4) Directed research on subject of mutual interest to student and staff member. May be repeated.

Materials Science and Engineering

(College of Engineering)

MAJORS

DEGREES

Metallurgical Engineering M.S., Ph.D.
Polymer Engineering M.S., Ph.D.

Joseph E. Spruelli, Head

Professors:


Lowndes, Douglas H., Ph.D. ....... Colorado Lundin, Carl D., Ph.D. ............... Rensselaer Oliver, Ben F., Ph.D. ............... Penn State


Associate Professors:

Becker, William T., Ph.D. .......... Illinois Benson, R. S., Ph.D. ............... Florida State Meek, Thomas T., Ph.D. .......... Ohio State

Assistant Professor:

Klit, Kevin, Ph.D. ..................... Delaware

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical Engineering or Polymer Engineering. Both the metallurgical and polymer programs are flexible and interdisciplinary in nature. Students may be admitted from a wide range of disciplines; these include physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials engineering, and engineering science programs. Prospective students should consult materials science and engineering faculty concerning development of individual concentrations or special programs compatible with their background and goals.

Areas of concentration within the metallurgical engineering program include physical metallurgy, materials processing; welding metallurgy and materials joining; corrosion behavior; failure analysis; and mechanical and physical behavior of materials. Specializations in electronic, ceramic, and composite materials are available.

Areas of concentration within the polymer engineering program include rheology and polymer processing; polymer morphology; mechanical, physical and chemical behavior of polymers; and composite materials.

THE MASTER'S PROGRAM

Thesis Option

A total of 30 semester hours is required for the M.S. degree in either Metallurgical Engineering or Polymer Engineering. Additional requirements include:

1. A major consisting of at least 12 semester hours of graduate courses in metallurgical engineering or polymer engineering. The polymer engineering major must include 540, 541, 543, 546, 549, 550 and 572 unless similar material has been covered in prior coursework.

2. Additional courses up to 12 hours total in related areas.


4. Satisfactory performance on a comprehensive oral examination administered by the faculty committee.

All resident students are required to register for and participate in the graduate seminar in metallurgical engineering or polymer engineering, as appropriate, during each semester in which it is offered. Three hours of MSE 503 or 504, Seminar graded Satisfactory/No Credit, may be counted toward degree requirements.

Non-Thesis Option

Any candidate may apply for a non-thesis option. Upon acceptance, a supervisory committee of three will be appointed. At least two members of the committee will be from the
GRADUATE COURSES

405 Structural Characterization of Materials (4) X-ray diffraction and fluorescence; scanning and transmission electron microscopy; microanalytical techniques.

421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear elastic constitutive equations, isotropic and anisotropic moduli in various materials; yield criteria; brittle fracture; crazing; plastic strain constitutive equations, forming operations and limit criteria. Prereq.: Mechanical Behavior of Materials, Mechanics of Materials, sophomore mathematics.

422 Chemical Process Metallurgy (3) Application of chemical thermodynamics to metallurgical processing; Ferrous and nonferrous pyrometallurgical refining; slag-metal equilibria, solidification, gas-metal processing. Prereq.: 203.

429 Introduction to Ceramic Matrix Composites (3) Characteristics of composites: ceramic matrix composites; macromechanics and materials design; overview of fabrication techniques; microstructural characterization; physical and mechanical property evaluation; current and potential applications. Prereq.: Introduction to Materials Science and Engineering and Mechanics of Materials or equivalent and consent of Instructor. (Same as Engineering Science 426.)

443 Polymer Processing (3) Rheological measurements; flow through tubes and elbows; end effects and extrudate swell; selected application, screw extrusion, injection molding; synthetic fibers, spinning methods, structure development, properties.

444 Plastics Fabrication and Design (3) Lectures, laboratories and field trips; unit operations of plastics fabrication; plastics classification; design and selection criteria; processing techniques; characterization laboratory. Sp


472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq.: 200 or equivalent. (Same as Engineering Science 426.)

474 Biomaterials (3) Metals, polymers and ceramics used in orthopedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems; material properties of PEMs; tissue response to synthetic materials. Prereq.: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 423.)

484 Introduction to Maintenance and Reliability Engineering (3) (Same as Nuclear Engineering 484, Industrial Engineering 484, and Mechanical Engineering 484.)

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses university facilities and for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SNC only. E

503 Graduate Seminar in Metallurgical Engineering (1) Prereq.: Admission to graduate program. May be repeated. SNC only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq.: Admission to graduate program. May be repeated. SNC only. E

505 Engineering Analysis (3) (Same as Chemical Engineering 505.)

522 Defects in Crystals (3) Analytical and experimental analysis of defect interactions in solids. Prereq.: 421 or consent of Instructor.

523 Plastic Deformation of Metals (3) Geometry and mechanisms of single crystal plastic deformation; slip, twinning; and cleavage; metal hardening; effect of texture, loading rate effects; effect of ordering and solid solution alloying; polycrystalline behavior in terms of single crystal deformation mechanisms; texture formation. Prereq.: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems; refining, oxidation, surface treatments, alloy systems. Prereq.: 570 or equivalent.

525-26 Welding Metallurgy (3, 3) Welding processes; physical metallurgy of welding; phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation; applications to process utilization.

528 Ceramic Matrix Composites: Material and Mechanisms (3) (Same as Engineering Science 528.)

539 Diffusion in Solids (3) Phononmechanism and atomic mechanisms of diffusion in solid state. Solution and applications of diffusion equations; random walk problem and mechanisms of diffusion; diffusion in dilute and concentrated alloys. Kirkendall effect; high diffusivity paths.

530 Phase Transformations in Metallic Materials (3) Thermodynamics of phase equilibrium, theory of nucleation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

531 Advanced Corrosion (3) Analysis of corrosion processes in terms of point defect measurements and Pourbaix diagram. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq.: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers. Molecular characterization: solution methods and spectroscopy. Prereq.: Semester of organic chemistry and thermodynamics or equivalent.

541 Fluid Mechanics and Polymer Processing (3) Navier-Stokes equations and illustrative problems; applications in chemical engineering and polymer engineering, packed and fluidized beds, multiphase systems. Basic concepts in rheology applications in polymer processing: screw extrusion, fiber spinning, injection molding. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) Description and analysis of selected polymer processing operations. Prereq.: 541.


544 Polymer Solution Thermodynamics and Characterization (3) Theories of solutions, statistical thermodynamics, characterization, treatment of chromatography, viscosity, light scattering and osmotic pressure. Prereq.: Undergraduate physical chemistry.

546 Mechanical Properties of Solid Polymers (3) Types of mechanical behavior: Hookean and rubber elasticity; plastic deformation; fracture; linear viscoelasticity; dynamic mechanical behavior and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymer composites.

549-50 Laboratory Methods in Polymer Engineering (1,2) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, rheometry, mechanical properties of solid polymers, polymer processing operations. Coreq.: 540 or consent of instructor. 549-S/NC only.

560 Principles of Ceramic Processing (3) Treatment of ceramic processing, raw materials preparation and characterization, powder, solution and gel processing, sintering and firing techniques, mechanisms and kinetics. Prereq.: 360 or equivalent.

561 Inorganic Glass Forming Systems (3) Physical and chemical structure of inorganic glasses; structural theories of glass formation; major glass forming systems: silica, other oxide glasses, nitrate glasses, water glasses, and chalcedonic glasses. Prereq.: 360, Chemistry 371.
Mathematics

(College of Arts and Sciences)

MAJOR DEGREES

Mathematics ................. M.M., M.S., Ph.D.

John B. Conway, Head

Professors:

Alexides, V., Ph.D. .............. Delaware
Allakos, N., Ph.D. .............. Brown
Anderson, D. F., Ph.D. ......... Chicago
Baker, G. A., Ph.D. ............. Cornell
Bradley, John S. (Emeritus), Ph.D.
Carruth, J. H. (Emeritus), Ph.D. Louisiana State
Clark, C. E., Ph.D. ............. Louisiana State
Conway, J. B., Ph.D. ........... Louisiana State
Daverman, Robert J., Ph.D. ...... Wisconsin
Dobbs, D. E., Ph.D. ............. Cornell
Dyidak, J., Ph.D. ................. Warsaw
Frandsen, Henry (Emeritus), Ph.D. .... Illinois
Gross, L. J., Ph.D. .............. Cornell
Hinton, D. B., Ph.D. .......... Tennessee
Husch, L. S., Ph.D. .............. Florida State
Johannson, K., Ph.D. .......... Bielefeld
Jordan, G. Samuel, Ph.D. ......... Wisconsin
Kareakeashian, C., Ph.D. ....... Harvard
Kuperanshmidt, B. (UTSI), Ph.D. .... MIT
Lenhart, S., Ph.D. .............. Kentucky
McConnel, R. M., Ph.D. .... Duke
Mathews, H. T. (Emeritus), Ph.D. .... Tulane
Miller, D. D. (Emeritus), Ph.D. .................. Michigan
Mulay, S. Ph.D. ............... Purdue
Rajput, B. S., Ph.D. .......... Illinois
Reddy, K. C. (UTSI), Ph.D. ...... Indian IT
Rosinski, J., Ph.D. ............. Wrocław
Schaefer, P. W., Ph.D. ........... Maryland
Serbin, Steve, Ph.D. ............. Cornell
Simpson, H., Ph.D. .............. Cal Tech
Son, K. (Emeritus), Ph.D. .... Oregon State
Son, R. P., Ph.D. .............. Oregon State
Stallman, F. W. (Emeritus), Ph.D. ... Giessen
Stephenson, K. R., Ph.D. ...... Wisconsin
Sundberg, C., Ph.D. .......... Wisconsin
Thisthewale, M. B., Ph.D. ... Manchester
Wade, W. R., Ph.D. .......... California (Riverside)
Wagner, C. G., Ph.D. ......... Duke

Assistant Professors:

Collins, Charles R., Ph.D. .... Minnesota
Freire, A., Ph.D. .............. Princeton
Kimble, K. R. (UTSI), Ph.D. .... Ohio State
Kot, Mark, Ph.D. ............ Arizona
Kuo, Y., Ph.D. .............. Cincinnati
Pflaut, Conrad, Ph.D. ...... Maryland
Richter, Stefan (Liaison), Ph.D. .... Michigan
Row, W. H., Jr., Ph.D. .......... Wisconsin
Smith, J., Ph.D. .............. California

Applicants must have successfully completed at least one year of calculus (141-42 or equivalent) and a course in matrix algebra (251 or equivalent). The following requirements must be met: 1. Complete 30 hours of coursework of which 21 must be at the 500 level. The coursework must include 504, 505, 506, 507, and 6 hours in 509. At most, 6 hours may be taken outside the Department of Mathematics (selected in consultation with the advisor). 2. Pass a final examination upon completion of all coursework.

In exceptional circumstances, part of admission requirement (b) might be satisfied concurrently with coursework. Normally Master of Mathematics degree students will start the program by taking 504 during the summer.

THE MASTER OF SCIENCE PROGRAM

The department offers two options for the Master of Science degree. The first option requires a thesis for which 6 hours must be earned along with 24 additional hours of work in acceptable courses numbered above 400. Of the additional hours, 6 may be in an area outside the department and 15 must be in courses in mathematics numbered above 500. After one semester of graduate study, a student whose advisory committee gives its approval may choose the non-thesis option, for which 30 hours in courses numbered above 400 are required. Of these, 21 hours (at least 15 of which must be in mathematics) must be in courses numbered above 500. Of the 30 hours, 9 in courses approved by the advisory committee may be taken in fields other than mathematics. For this option it is required that a written final examination be passed and that credit be received for a reading course (598) in which a term paper or project is required.

Concentration in Applied Mathematics

For this concentration, available for the thesis or the non-thesis option, the student must complete the following:


2. One hour of Seminar in Applied Mathematics for Seminar in Mathematical Ecology 569.

THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following four requirements in addition to those of The Graduate School:

1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. A student intending to work in mathematical ecology may complete either but is strongly encouraged to complete the interdisciplinary mathematical ecology concentration. A student may elect to switch from one to the other provided the constraints of the latter option have not been violated. A student's status after electing such transfer is determined by the complete history of the student's earlier mathematics examinations from the standard program and the interdisciplinary mathematical ecology concentration. Descriptions of both programs are given below.

2. Demonstrate proficiency in one foreign language, normally French, German, or Russian. This requirement must be met prior to the examination in the area of specialization. A student's doctoral committee may require the student to pass a second language examination.

3. Pass an examination in the field of specialization. After the requirements in 1. and 2. have been met, this examination will be given by a committee appointed by the department head. A student may take this examination only twice.

4. Pass a one-year, 600-level sequence in mathematics outside the student's area of specialization. The sequences selected to fulfill this requirement must be approved by the department head and the student's doctoral committee. (Such approval may occur after completion of the sequence.)

Requirements 1-4 must be completed no later than the start of a student's seventh year (as a mathematics graduate student at UT Knoxville).

Standard Program

Demonstrate knowledge in five subjects selected from the lists below by passing written examinations in three subjects and by earning grades of B+ or better each semester in the courses associated with two additional subjects.* The three subjects selected for written examinations must be from Groups I, II, III. At least two groups must be represented in the three written examinations. At least three groups must be represented in the five subjects.


A student's five subjects may not include both Real Analysis and Applied Linear Analysis or both Mathematical Principles of Fluid Mechanics and Mathematical Principles of Continuum Mechanics. A student may not count examinations in both Ordinary Differential Equations and Partial Differential Equations, but both may be included in a student's five subjects. With prior approval of the graduate committee, a student may utilize as a Group IV course a year-long graduate-level sequence from outside the Department of Mathematics. At most one such utilization may be made.

A student may take as many written examinations as desired at any time the examinations are given, subject to the following conditions:

1. The examinations to be taken must be approved in advance by the student's advisory committee.

2. At any one time a student may take at most one examination.

3. A student may take a collection of written examinations a maximum of three times, but no one failing 4 examinations, counting possible repetitions, will be permitted to take another examination. An exception is that a student who does not have a master's degree in mathematics and who has been enrolled in a UTK graduate program in mathematics no longer than one year may take written examinations at one time during that year without having that setting for the examinations or any incurred failure(s) count toward the limits imposed above.

4. At least two examinations must be taken and at least one must be passed before the start of a student's fourth year. Three examinations must be passed before the start of a student's fifth year.

Mathematical Ecology Concentration

The student must pass written examinations in three subjects:


2. A subject from Groups I, II, and III of the standard program.

3. A subject represented by a year-long graduate-level sequence from outside the Department of Mathematics. The sequence must be approved in advance by the mathematical ecology faculty and by the departmental Graduate Committee. At least one member of the mathematical ecology faculty must be involved in the grading of the examination. The examination in this subject may be taken only twice.

The student also must earn grades of B+ or better each semester in the courses associated with two additional subjects from the groups listed in the standard program. This requirement may not be satisfied with courses from outside the department. At least one of the subjects used to meet this requirement or the written examination subject in 2. must be from Groups I and II.

The examination must be approved by the department head and the student's doctoral committee. A student may take a collection of written examinations at any time the examinations are given, subject to the following conditions:

1. The examinations to be taken must be approved in advance by the student's advisory committee.

2. At any one time a student may take at most one examination.

3. A student may take a collection of written examinations a maximum of three times, but no one failing 4 examinations, counting possible repetitions, will be permitted to take another examination. An exception is that a student who does not have a master's degree in mathematics and who has been enrolled in a UTK graduate program in mathematics no longer than one year may take written examinations at one time during that year without having that setting for the examinations or any incurred failure(s) count toward the limits imposed above.

4. At least two examinations must be taken and at least one must be passed before the start of a student's fourth year. Three examinations must be passed before the start of a student's fifth year.

5. At least one of the examinations taken must be from a group of subjects not included in the standard program, including the restrictions on related subjects, the conditions a through d. placed on the taking of written examinations, and the option to pass a written examination in lieu of earning a grade of B- or better in one subject in a sequence from Group I, II or III.

GRADUATE COURSES

400 History of Mathematics 5 Development of major ideas in mathematics from ancient to modern times and the influence of ideas in science, technology, philosophy, art, and other fields. Writing requirement. May be offered in class, seminar, or distance education format. 3-4 hours.

401 Mathematics and Microcomputers 5 Primarily for students seeking certification in elementary and secondary school mathematics classrooms. Computer programming experience and microcomputer knowledge assumed. 3-4 hours.

402 Models in Biology 5 Difference and partial differential equations of biological systems. May not be counted toward graduate degree. 3-4 hours.

411 Mathematical Modeling 5 Construction and analysis of mathematical models used in science and industry. Projects. Prerequisites: Differential Equations, Calculus III, and Matrix Algebra I.

421 Combinatorics 5 Introduction to problems of construction and enumeration for discrete structures: sequences, partitions, graphs, finite fields and geometries, on experimental designs. Prerequisites: Probability and Statistics or consent of instructor.

423 Probability I 3 Axiomatic probability, multivariate distributions, conditional probability and expectations, methods of moment generating functions, laws of large numbers and central limit theorem. Prerequisite: 300-level probability or consent of instructor.

424 Probability II 3 Elements of stochastic processes: Random walk, Markov chains and Poisson processes. Other topics as selected by instructor. Prerequisite: 423.

425 Statistics 3 Determination of standard statistical distributions: t, F and z; nonparametric methods: Wilcoxon, Kruskal-Wallis, Mann-Whitney-U tests; distributions, conditional probability and expectations. Prerequisite: Consent of instructor.

426 Advanced Calculus II 3 Advanced calculus II. Prerequisites: Consent of instructor. Prerequisite: Advanced Calculus I.

427 Advanced Calculus II 3 Advanced calculus II. Prerequisites: Consent of instructor. Prerequisite: Advanced Calculus I.

428 Honors: Advanced Calculus II 3 (3, 3) Honors version of 427-428. Prerequisite: Consent of instructor. Prerequisite: Consent of instructor.

500 Advanced Calculus I 3 (3, 3) Honors version of 427-428. Prerequisite: Consent of instructor. Prerequisite: Consent of instructor.
500 Thesis (1-15) P/NP only. E

499 Seminar in Mathematics (1-3) Topics vary. Requires out-of-class projects and in-class presentations by students. Credit hours announced for each seminar. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

490 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study with faculty guidance. Prereq: Consent of faculty mentor to supervise independent work. May be repeated. Maximum 9 hrs.


455-56 Abstract Algebra I, II (3,3) Algebraic structures: groups, rings, fields, vector spaces and linear transformations. Prereq: Matrix Algebra I and introduction to Abstract Mathematics, or consent of instructor.


511-12 Methods in Applied Mathematics I, II (3,3) Fundamentals and techniques associated with discrete and continuous models of physical, engineering and biological systems; difference equations, networks, graphs, optimization, time series analysis, qualitative analysis of differential and delay-differential equations, and other topics. Coreq: 510 or 512. Prereq: 445-446, 447, or consent of instructor.

513-14 Mathematical Principles of Fluid Mechanics I, II (3,3) Equations of motion, incompressible and compressible potential flow, shock waves, vortices, Navier-Stokes equations. Prereq: 451, 453, and 445-446 or 404, or consent of instructor.


517-18 Mathematical Methods in Physics I, II (3,3) (Same as Physics 517-518.)

519 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.

521-22 Enumerative Combinatorics I, II (3,3) Methods of enumeration, generating functions and the study of group actions on sets and trees. Prereq: 519 or 411 or 412. Recommended prereq: 453. (Same as Computer Science 521-522.)


527 Stochastic Modeling (3) Models in probability applied to real life situations; queuing theory; branching processes; Monte Carlo simulation. Prereq: 445 or 446 or consent of instructor.


534 Calculus of Variations (3) (3) Calculus on manifolds, differential forms, Stokes' theorem. Prereq: 445-446 and 447 or consent of instructor.


537-38 Mathematical Principles of Continuum Mechanics I, II (3,3) Conservation laws, applications of variational principles, equations of equilibrium and motion for fluids and solids, constitutive relations and stress, convexity properties, bifurcation phenomena, existence theorems, Prereq: 431, 435, 445, 446, or consent of instructor.}

541-42 Real Analysis I, II (3,3) Measure theory. Prereq: 540. Prereq: 445-446.}


549 Seminar in Analysis (1-3) May be repeated. Maximum 9 hrs.

550 Seminar in Applied Mathematics (1-3) Prereq: Consent of instructor.}


559 Seminar in Algebra (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

561-2 Modern Algebra I, II (3,5) Groups, rings, modules and linear algebra. Prereq: 453. (Same as Computer Science 561-562.)


559 Seminar in Algebra (1-3) Prereq: Consent of Instructor. May be repeated with consent of department. Maximum 12 hrs.


663-64 Algebraic Topology (3,3) Homology, cobordism, and homotopy theories; duality theorems and Hurewicz isomorphism theorem. Prereq: 581-82 and 1 yr of abstract algebra, 456-546 or 551-52. May be repeated with consent of department. Maximum 12 hrs.

667-68 Advanced Differential Geometry (3,3) Selected topics from Riemannian geometry and analysis on manifolds; Lie groups, metric geometry, spectrum of Laplacian, Hodge Theory, variational problems, curvature and topology of manifolds. Prereq: 567-568 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

669 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.


679 Seminar in Numerical Mathematics (1-3) May be repeated with consent of department. Maximum 12 hrs.

681-82 Advanced Mathematical Ecology (3,3) Selected topics in theoretical and applied mathematical ecology: population, community, ecosystem ecology and applied topics such as demography, ecotoxicology, epidemiology, environmental change, and resource management. Prereq: 581-82. May be repeated. (Same as Ecology and Evolutionary Biology 681-82.)

Mechanical and Aerospace Engineering and Engineering Science

(College of Engineering)

MAJOR

DEGREES

Aerospace Engineering ............ M.S., Ph.D.
Mechanical Engineering .......... M.S., Ph.D.

D. W. Daring, Head

Professors:

Antar, B. (UTSI), Ph.D. ............. New York

Baker, A. J., Ph.D. ............. Texas A&M

Collins, F. G. (UTSI), Ph.D. ....... Georgia Tech

Crawford, R. A. (Emeritus) (UTSI), Ph.D. ....... California Tech

Daring, D. W., Ph.D. ............. Illinois

Edmonson, A. J., Ph.D. .......... Texas A&M

Flandro, G. A (UTSI), Ph.D. ....... Iowa State

Fortress, J. H., Ph.D. ............. Georgia Tech

Fuller, J. W. (Emeritus) (UTSI), Ph.D. ....... Virginia Tech

Johnson, W. S., Ph.D. ............. Florida

Keeler, D. R. (UTSI), Ph.D. ....... Ohio State

Keyhani, M. (Liaison), Ph.D. ....... NC State

Krine, R. J., Ph.D. ............. Oklahoma

Landos, J. D., Ph.D. ............. Illinois IT

Lee, C. W. (Emeritus), Ph.D. ....... Iowa State

Lisbon, H., Jr. (Emeritus), Ph.D. ....... Case Western

M.A. George Washington

Lo, C. F. (UTSI), Ph.D. ............. Cornell

McCay, M. H. (UTSI), Ph.D. ....... Florida

McClay, T. D. (UTSI), Ph.D. ....... Auburn

Maxwell, R. L. (Emeritus), Ph.D. ....... Georgia Tech

M.S. Johns Hopkins

Shulz, R. J. (UTSI), Ph.D. ............. Tennessee

Scott, W. E. (Emeritus), Ph.D. ....... Johns Hopkins

Shahrokhi, F. (UTSI), Ph.D. ....... Oklahoma

Shobe, L. R. (Emeritus), Ph.D. ....... Kansas State

Smith, G. V., Ph.D. ............. Pennsylvania

Snyder, W. T., Ph.D. ............. Northwestern

Soliman, O., Ph.D. ............. Tennessee

Speckhart, F. H. (IBM Prof.), Ph.D. ....... Georgia Tech

Stair, W. K. (Emeritus), M.S. ....... Tennessee

Stieinhoff, J. S. (UTSI), Ph.D. ....... Chicago

Stoneking, J. E., Ph.D. ............. Illinois

Vaidi, A. D. (UTSI), Ph.D. ....... Cincinnati

Weissman, J. E., Ph.D. ............. Pennsylvania

Wilson, C. J. (Emeritus), Ph.D. ....... Rensselaer

Wilkerson, H. J., Ph.D. ............. Tennessee

Wu, J. M. (Emeritus), Ph.D. ....... Cal Tech

Young, R. A. (Emeritus), Ph.D. ....... Beijing Institute

Associate Professors:

Bouquet, J. A. M., Ph.D. ............. Stanford

Cezeaux, J. L., Ph.D. ............. Rensselaer

Engels, R. C. (UTSI), Ph.D. ....... VPI

Hamel, W. R., Ph.D. ............. Tennessee

Hopkins, J. A. (UTSI), Ph.D. ....... Tennessee

Iannelli, G. S., Ph.D. ............. Tennessee

Kawiecki, G., Ph.D. ............. West Virginia

Madhukar, M., Ph.D. ............. Drexel

Mathews, A., Ph.D. ............. Illinois

Moulder, T. H. (UTSI), Ph.D. ....... Tennessee

Nguyen, K., Ph.D. ............. Colorado

Venkatatraswaram, S., Ph.D. ............. California (San Diego)

Assistant Professors:

Lyne, J., M.D., Ph.D. ............. NC State

Ponko, C. D., Ph.D. ............. Georgia Tech

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are available in majors in Mechanical Engineering, Aerospace Engineering, and Engineering Science. Changing from one of these programs to another requires depart-
ment approval. Each applicant is advised as to any prerequisite courses before entering a program.

In Mechanical Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; general dynamics; machine design; dynamics, control, and robotics; power generation; and stress analysis.

In Aerospace Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; aerodynamics and performance; gas dynamics; flight and aerospace mechanics; aerospaceacoustics; and structures and stress analysis.

In Engineering Science, program concentrations include solid mechanics, fluid mechanics, computational mechanics, mechanics of composite materials, applied artificial intelligence, biomechanical engineering, industrial engineering, and control engineering (UTS only). In each of these concentrations, interdisciplinary programs are arranged to meet individual needs or interests. The flexibility and interdisciplinary aspect of the program concentrations are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering or can best be met by interdisciplinary study in engineering. The program'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.

In Mechanical Engineering or Aerospace Engineering, entrance into the Master of Science program 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. A program application is required in addition to the Graduate School application. Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds. The GRE is required of all international applicants for admission.

In Engineering Science, entrance into the graduate program is available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. A program application is required in addition to the Graduate School application. The names and addresses of four references must be included with the program application. The general GRE is required of all international applicants for admission.

Each student must satisfactorily complete a program of study that has been approved by his/her advisory committee and complies with the requirements of the Graduate School. In Engineering Science, the student's major professor may be selected from a department other than the Department of Mechanical and Aerospace Engineering and Engineering Science; however, at least one member of the student's graduate advisory committee must be on the faculty of the Department of Mechanical and Aerospace Engineering and Engineering Science.

THE MASTER'S PROGRAM

In both Mechanical Engineering and Aerospace Engineering, three M.S. options are offered. Option I requires a thesis, while Options II and III do not. Option I is the normal program for recent graduates. Options II and III provide (a) graduate students with significant professional work experience and (b) graduate co-op students the opportunity to focus their programs in special areas through either greater coursework or selected engineering problems.

Credit requirements for these three options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option I</td>
<td>12</td>
</tr>
<tr>
<td>Option II</td>
<td>12</td>
</tr>
<tr>
<td>Option III</td>
<td>12</td>
</tr>
</tbody>
</table>

All three program options require participation in the departmental graduate seminars and passing a final examination on all work submitted for the degree. Option II final examination will cover all course work. Option III final examination will cover all the selected engineering problems.

The thesis option, Option I, requires submission and defense of a written thesis that demonstrates the ability to conduct and report an independent investigation.

The thesis option, Option I, requires a formal report to be written for each selected engineering problem.

In Engineering Science, two M.S. options are offered: Option I requires a thesis, while Option II does not. The Option I is restricted to those students who have had significant engineering professional work experience. In Option I, a minimum of 30 semester hours including the thesis is required. In Option II, a minimum of 30 hours is required. Credit requirements for these two options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option I</td>
<td>12</td>
</tr>
<tr>
<td>Option II</td>
<td>12</td>
</tr>
</tbody>
</table>

Both program options require participation in the departmental graduate seminar program and passing a final examination on all work submitted for the degree.

THE DOCTORAL PROGRAM

All students must complete a minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the master's thesis. These shall include a minimum of 24 semester hours in Doctoral Research and Dissertation and a minimum of 48 semester hours in other courses.

In Mechanical Engineering or Aerospace Engineering, the courses must include:

1. A minimum of 12 semester hours of graduate credit in mathematics in courses numbered 400 or above with a minimum of 6 semester hours numbered 500 or above.

2. A minimum of 24 semester hours in the department in courses numbered 500 and above, with at least 12 of these semester hours in the major. A minimum of 3 semester hours of courses is required at the 600 level. These are exclusive of thesis, problems, or dissertation credit. The student's advisory committee can approve a student's petition to replace one 600-level course with one or more 500-level courses that are more appropriate.

In Engineering Science, the courses must include:

1. A minimum of 24 semester hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 500 and above, with at least 9 semester hours of 600-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.

2. A minimum of 12 semester hours in mathematics or computer science in courses numbered 400 and above, exclusive of a first course in ordinary differential equations.

Additional requirements for all students include:

1. Participation in the departmental seminar program.

2. Meet all departmental examination requirements, which include passing a written and oral comprehensive examination.

3. Presentation of a dissertation proposal to the student's advisory committee and approval of that proposal by that committee.


ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph. D. program in Aerospace Engineering is available to residents of the states of Arkansas or Kentucky. The M. S. in Aerospace Engineering is available to residents of Kentucky. The Ph. D. program in Engineering Science is available to residents of the state of Florida (concentration in biomedical engineering only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.
Aerospace Engineering

NOTE: Not all the courses listed below are available at both the UT Knoxville and the UTSI campuses.

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aerodynamic bodies for desired characteristics. Potential flow theory, viscous effects, compressibility effects. Subsonic, transonic, and supersonic airfoils. Prereq: 570, F.


425 Propulsion (3) Principles of propulsion devices; turbojet, ramjet and rocket engines. Prereq: 351. F.

426 Introduction to Aerospace Design (2) Design process, synthesis, safety, reliability, patents, product liability, economic analysis, optimization, design standards, design studies. Individual design reports. Prereq: 351, 370, 383. Coreq: Mechanical Engineering 344. F.


511 Inviscid Flow (3) Kinematics and dynamics of inviscid flows; potential flow about body, conformal mapping. Prereq: 422 or Mechanical Engineering 531, Mathematics 425 or equivalent.

513 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; representative experiments: hot wire anemometry and turbulence measurements, flow visualization, wind tunnel testing, flow visualization, water tunnel testing, water tunnel flow experiments, boundary layer measurements, laser-optical measurements. Prereq: 423 or Mechanical Engineering 531.

515-16 Air Vehicle Aerodynamics and Performance (3,3) Application of aerodynamic principles to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and altitude, propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 422; 515 for 516.

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional internal and external flow; waves, small perturbation theory; slender body theory; similarity rules; method of characteristics. Prereq: 422 for 521; 521 for 522.

525 Hypersonic Flow (3) Slender body flow; similarity; Newtonian theory, blunt body flow, viscous interactions, free molecule and rarefied gas flow. Prereq: 512.

527-28 Aerospace Ground Test Facilities (3,3) Atmospheric models and similarity considerations; aerodynamic test facilities; continuous and intermittent wind tunnels and ballistic ranges; propulsion test facilities or air breathing and rocket engines; space environment and space vehicle test facilities. Prereq: 512 and 521, Mechanical Engineering 513 and 514.

529 Rarefied Gas Dynamics (3) Binary elastic collisions; kinetic theory; flow regimes; Boltzmann's equation and its approximations; transfer equation, gas-surface interactions; slip boundary conditions, free molecule, slip and transition flow; Monte Carlo simulation; experimental techniques. Introduction to hypercronic real gas flows. Prereq: 522, Mechanical Engineering 522.

531 Magnetohydrodynamics (3) Electromagnetic field equations, fluid dynamics, thermodynamic properties of gases, and plasma applications and applications. Prereq: 422 and Mathematics 471.

532 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra, diffusion, application of turbulent jets and pipe flow. Prereq: 511-12.

534 Atmospheric Entry (3) Reentry trajectories; lift and drag during reentry; vehicle motion and stability during reentry; aerodynamic heating and heat protection systems. Prereq: 522. Recommended prereq: 512.

544 Transonic Flow (3) Nature of flow at transonic speeds; small disturbance theory; shock waves; free undisturbed rarefied flows; strong viscous interaction phenomena; solution techniques. Prereq: 522.


554 Aerospace Vehicle Stability and Control (3) Static and dynamic longitudinal directional and lateral stability and control. Coupled modes. Motion with free and fixed flight control surfaces. Automatic control systems. Prereq: 423, 531.


581 Fundamentals of Acoustics (3) Generation, propagation and absorption of sound; noise control and moving media. Prereq: Consent of instructor.

584 Spacecraft Attitude Dynamics and Control (3) Rotational attitude dynamics of space vehicles. Gyroscopic instruments; passive and active attitude control devices. Linear control theory and attitude stabilization. Prereq: 551, Mathematics 471.

584 Space Engineering: Satellite Technology (3) Satellites and rockets (orbit, launch vehicles and launching), spacecraft structure, power systems, attitude control systems, telemetry/teletracking/command, and communication systems, spacecraft testing, reliability, and application of satellites (communication, weather, Earth observation, and future applications). Prereq: 425, Mathematics 471, 404.

596 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor.

599 Special Topics in Aerospace Engineering (1-3) May be repeated. Maximum 6 hrs.


632 Magnetohydrodynamics II (3) Alfven and shock waves, exact solution for magnetohydrodynamic channel flow, one-dimensional model of channel flow, engineering applications of magnetohydrodynamics, propulsion and power generation. Prereq: 631 and Mathematics 562.

641-42 Physical Gas Dynamics (3,3) High speed, high temperature gas flow from molecular point of view. Kinetic theory, statistical mechanics, equilibrium flow, vibrational and chemical energy, shock waves, vibrational and chemical energy, non-equilibrium kinetic theory, flow with transitional and non-equilibrium. Prereq: 522, Mechanical Engineering 522.

646 Theory of Turbulence (3) Same as Engineering Science and Mechanics 645.


680 Advanced Topics in Aerospace Engineering (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Engineering Science

GRADUATE COURSES

423 Fracture-Safe Design (3) Critical review of variables controlling fracture toughness: part and flaw geometry, temperature, loading rate, section size, material, characterization of fracture toughness by stress intensity factors, strain energy release rates, J integral, COD data, transition temperature tests; use of fracture toughness data in design. Prereq: 321 and Materials Science and Engineering 201; (Same as Materials Science and Engineering 475). 3 hrs or 2 hrs and 1 lab.

426 Fundamental Principles of Composite Materials (3) (Same as Materials Science 472.)

429 Introduction to Ceramic Matrix Composites (3) (Same as Materials Science and Engineering 429.)

433 Dynamic Systems (3) Three dimensional dynamics of particles and rigid bodies; gyroscopes; variable mass systems; central force motion; Lagrange's equations; stability; transfer functions. Prereq: Dynamics.

435 Engineering Acoustics (3) Concepts of acoustics; measures of sound and their units; noise generation and transmission; noise control principles and application; materials and procedures for noise abatement. Prereq: Senior standing or consent of instructor.

442 Fluid Mechanics II (3) Integral forms of linear and angular momentum equations and applications to pumps and turbines; performance; energy; differential conservation equations; internal one-dimensional incompressible and compressible flows; potential flow; methods of flow measurement; laboratory. Prereq: Fluid Mechanics I, Differential Equations 1, Calculus III.

461 Experimental Stress Analysis (3) Theory, techniques, and instrumentation of resistance strain gauges; theory and techniques of brittle coating method; introduction to strain measuring devices. Prereq: 201, Electrical and Computer Engineering 301, 2 hrs and 1 lab.

465 Dynamic Data Acquisition (3) Use and calibration of instrumentation for measuring and recording dynamic events; Fourier analysis; transfer function analysis; digital signal processing; data reduction; experimental parameter estimation with applications to modal vibration analysis. Prereq: Circuits and Electo Mechanical Components. Mechanical Vibration. 2 hrs and 1 lab.
541 Advanced Topics in Fluid Mechanics and Convective Heat Transfer (3) Convective momentum, heat and mass transfer; boundary layer analysis, stability, transition, turbulence, closure models; Navier-Stokes equations.

645 Theory of Turbulence (3) Mathematical descriptions of turbulence; isotropic turbulence, energy spectra, Kolmogorov's hypothesis, large and small eddy structure for turbulence, turbulent diffusion by continuous movement; applications to turbulence, wakes, pipe flow, boundary layers. Prereq: Mechanical and Aerospace Engineering and Engineering Science 542. (Same as Aerospace Engineering 545.)

567 Computational Mechanics Seminar (1) Current developments in computational fluid-thermal/structural mechanics. For departmental thesis students only. May be repeated.

681 Advanced Topics in Engineering Mechanics (3) Advanced problems in mechanics, group or individually. Prereq: Consent of instructor. May be repeated with consent of department.

Mechanical Engineering

NOTE: Not all the courses listed below are available at both the UT Knoxville and the UTSI campuses.

GRADUATE COURSES


451 Systems and Controls (3) Analytical models of physical systems comprised of combinations of mechanical, fluid, electrical, and thermal components; feedback control systems, transient and frequency response, stability analysis; non-linear control of linear systems; sampled data systems, digital filters. Prereq: Mechanical Engineering Instrumentation and Measurement, Circuits and Electrical Engineering 358.

455 Introduction to Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design effort; design report. Prereq: 456. Dynamics and Vibrations of Machines.

465 Introduction to Thermal Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design effort; design report. Prereq: 332, 344, 345. Coreq: 475. 3 labs. Sp, Su.


456 Introduction to Thermal Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design effort; design report. Prereq: 332, 344, 355.

471 Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychrometric processes; air washers; cooling towers; noise reduction; building heat transmission. Prereq: 332, 344.

475 Thermal Engineering (3) Thermodynamic cycles, heat exchangers, combustion and system analysis and design, second law and economic analysis. Prereq: 332, 344, F, Sp.


582 Rocket Propulsion II (3) Solid propellant rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance; thermodynamic cycles; rocket nozzle design for maximum performance; effect of chamber pressure and additives on solid propellant burn rates; analysis of two-phase solid rocket combustion; nontoxic propellant; chemical and physical properties of solid propellant rocket nozzles; rocket nozzle design. Prereq: Consent of instructor.

584-56 Turbomachinery Systems I (3, 3) Ideal cycle analysis of gas turbines, real cycle analysis, component performance analysis, component design and systems integration. Introduction to turbomachinery design theory and analysis; computer-aided design; structural considerations. Prereq: Consent of instructor.


590 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor. May be repeated. S/N only.

595 Seminar (1) All phases of mechanical and aerospace engineering and science research at UT and UTK. May be repeated. S/N only.
The Department of Microbiology offers both M.S. and Ph.D. degrees. To pursue a Ph.D., students are expected to have completed an undergraduate program with at least a 3.0 or better GPA on a 4.0 system. Included in the undergraduate course credits should be (1) a full year of general biological science, (2) one year of calculus, (3) two years of chemistry, including one year of organic, (4) one year of physics, and (5) an introductory course in microbiology. In many cases, deficiencies in requirements may be removed by taking appropriate courses during the first year of graduate study. The department also requires the general portion of the Graduate Record Examination. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

Each new graduate student meets with an advisory committee chaired by the departmental Director of Graduate Studies to plan a program of study for the first one or two semesters until a research advisor is selected. All first-year students participate in a laboratory rotation program during the first semester of study. The program allows the student to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.

THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to encourage creative and independent thinking. Two to three calendar years are usually needed for the course study that has the following requirements: (1) 30 hours including 6 thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in courses taken in the department; (4) satisfactory performance in at least one seminar as a teaching assistant; (5) one semester of physical chemistry; (6) one course in statistics; (7) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester in the program and passed before admission to candidacy; and (8) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology.

411 Bacterial Genetics (3) Transmission and expression of genetic information by bacteria. Prereq: Introduction to Microbiology. Sp

420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, rickettsia, chlamydia and fungi. Prereq: Introduction to Microbiology. Sp

428 Medical Microbiology Laboratory (3) Laboratory exercises in medically important areas of microbiology: microorganisms, pathology and immunology. Prereq: Introduction to Microbiology. Lab, 430. Coreq: 420. Sp

430 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation and diversity; cytokines; immunoregulation; humoral and cell cooperations and recognition in immune mechanisms; soluble factors. Prereq: General Genetics. F


470 Microbial Ecology (3) Physiological diversity and taxonomic identification of microorganisms in natural and simulated ecosystems. Prereq: 310, F

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

575 Applied Microbiology and Bioengineering (3) Same as Chemical Engineering 575, Environmental Engineering 576, and Agricultural Engineering 550.

501 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

595 General Seminar (1) Lectures and seminars by invited speakers, faculty, and graduate students. May be repeated. Maximum 18 hrs. S/NC only. E

596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. May be repeated. Maximum 4 hrs. S/NC only.

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

601 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

605 Journal Club in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
Modern Foreign Languages and Literatures

(Majors: College of Arts and Sciences)

*MAJORS*  

**DEGREES**

French ........................................... M.A.
German ........................................... M.A.
Spanish.......................................... M.A.
Modern Foreign Languages........ Ph.D.

Susan Martin, Head

Professors:

Barrette, Paul E., Ph.D. .............. California
Brady, Patrick (Shumway Chair of Excellence), D.U.P. ...
Campion, Edmund J., Ph.D. .......... Yale
Cobb, Carl W. (Emeritus), Ph.D. ... Tulane
DiPuccio, Denise M., Ph.D. .......... Kansas
Elliott, Jacqueline C. (Emeritus), M.A. ... Illinois
Falen, James E. (Emeritus), Ph.D. .... Pennsylvania
Fiene, Donald M. (Emeritus), Ph.D. ... Indiana
Handelman, Michael H., Ph.D. ....... Florida
Helfin, William H., Ph.D. ............ Florida State
Hodges, Carolyn R., Ph.D. .......... Chicago
Irving, Thomas B. (Emeritus), Ph.D. .... Princeton
Kratz, Henry (Emeritus), Ph.D. .... Ohio State
Levy, Karen D., Ph.D. ................. Kentucky
Maurino, Ferdinando D. (Emeritus), Ph.D. .... Columbia
Meiler, C. J., Ph.D. ................. Chicago
Osborne, J. C. (Emeritus), Ph.D. .... Northwestern
Pinsky, Carl (Emeritus), Ph.D. .... California
Ritzenhoff, Ursula C. (Emeritus), Ph.D. .... Connecticut
Rivera-Rodas, Oscar, Ph.D. ........ California
Romeiser, John B. (Liaison), Ph.D. .... Vanderbilt
Vazquez-Biglio, A. M. (Emeritus), Ph.D. ..... Minnesota
Wallace, Albert H. (Emeritus), Ph.D. .... North Carolina

Associate Professors:

Beauvois, Margaret, Ph.D. .......... Texas
Brizzo, Flavia, Ph.D. .......... Washington
Cree, Bryant, Ph.D. .......... California
DiMaria, Salvatore, Ph.D. .......... Wisconsin
Duncan, Cynthia K. (Liaison), Ph.D. .... Illinois
Holmsted, Christine (Liaison), Ph.D. .... Wisconsin
Lauckner, Nancy A. (Liaison), Ph.D. .... Wisconsin
Lee, David E., Ph.D. .......... Stanford
Nakuma, Constance, Ph.D. .... Sorbonne
Peruvshiha, Natalia K., Ph.D. ....... Bryn Mawr
Young, Dolly, Ph.D. ................. Texas

Assistant Professors:

Blackwell, Stephen H., Ph.D. ........ Indiana
Essif, Les, Ph.D. ................. Brown
Hoeyng, Peter, Ph.D. .......... Wisconsin
Kaplan, Gregory, Ph.D. ........ Pennsylvania
LaCure, Jon, Ph.D. .......... Indiana
McAlpin, Mary K., Ph.D. .......... Columbia
Ohnesorg, Stefan, Ph.D. .......... McGill
Silvathien, Eudice, Ph.D. .... North Carolina
Williams, Jin, Ph.D. .......... Ohio State

The Department of Modern Foreign Languages and Literatures offers graduate programs leading to the Master of Arts degree with majors in French, German, and Spanish, and the Doctor of Philosophy degree with a major in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

**THE MASTER'S PROGRAMS**

**French**

**Thesis Option:**

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500 Thesis. French 501 is required. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours (including 6 hours of thesis) must be taken in major, 6 in the minor.

2. A thesis, with a minimum of 6 semester hours in course 500.

3. A written examination covering the coursework and selected items from a master reading list.

4. Final oral examination covering the thesis.

**Non-Thesis Option:**

1. Completion of a minimum of 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including French 501. Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student's advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. Final oral examination covering the papers.

**German**

**Thesis Option:**

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500 Thesis. German 501 and 519-20 are required, as are three courses on German literature or culture, one of which may be at the 400 level. In addition, students must take three further courses, only one of which may be chosen from 411-12 or 485. All graduate teaching assistants should take 512, and other candidates may take 512 or any other course above 500. A maximum of three 400-level courses may be counted toward the 24 semester hours of course credit. All M.A. candidates must sit for a standardized language examination, such as the Zentrale Mittelstufenprüfung. Students who are interested in future Ph.D. study are strongly advised to choose the thesis option.

**Non-Thesis Option:**

The minimum requirements are 30 semester hours of coursework, including at least one 600-level course, for which a seminar paper is required. German 510 and 519-20 are required, as are three courses on German literature or culture, one of which may be at the 400 level. In addition, students must take three further courses, only one of which may be chosen from 411-12 or 485. All graduate teaching assistants should take 512, and other candidates may take 512 or any other 500-level course. A maximum of three 400-level courses may be counted toward the 24 semester hours of course credit. A common written exam over the designated reading list is required, as is a standardized language exam, such as the Zentrale Mittelstufenprüfung. Each non-thesis M.A. candidate will have a committee of three faculty members in German to whom the student will submit a dossier consisting of the seminar paper and one paper previously submitted in a graduate course. The length and type of the papers is described in greater detail in the Manual for Graduate Students in German.

**Spanish**

**Thesis Option:**

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500 Thesis. Spanish 501 is required. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours (including 6 hours of thesis) must be taken in major, 6 in the minor.

2. A thesis, with a minimum of 6 semester hours in course 500.

3. A written examination covering the coursework and selected items from a master reading list.

4. Final oral examination covering the thesis.

**Non-Thesis Option:**

1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including Spanish 550. Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student's advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. Final oral examination covering the papers.
3. A written examination covering the coursework and selected items from a master reading list.

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages requires advanced training in a major language and either a second language or applied linguistics.

Admission Requirements

Applicants must have completed a B.A. in either French, German or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Degree Requirements

Candidates must complete a minimum of 63 semester hours of coursework beyond the bachelor's degree in addition to 24 hours of doctoral research and dissertation.

For candidates with French or Spanish as a first concentration, two tracks are available.

The coursework for Track I must be distributed as follows: at least 39 hours in the first concentration; at least 18 hours in the second concentration; and at least 6 hours in a cognate field.

The coursework for Track II must be distributed in this way: at least 45 hours in the first concentration; at least 12 hours in the second concentration; and at least 6 hours in a cognate field. Because Track II students will have taken 12 graduate hours instead of 18 hours in the second concentration, they will normally not be eligible to teach that field at institutions which follow SACS guidelines for college foreign language teaching.

The coursework for all concentrations must be distributed as follows:

1. First Concentration: German. A minimum of 39 hours of German courses beyond the bachelor's degree, distributed as follows:
   - 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500 level: A minimum of 21 hours must be taken. These must include German 512, 519, 520, and 560. These hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
   - 600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

2. Second Concentration. A minimum of 18 (German or Track I) or 12 (Track II) hours beyond the bachelor's degree, taken in the field of applied linguistics or in a second language, either French, German, Italian, Portuguese (Track II only), Russian or Spanish. For Track I and German, 12 of these hours must be at the 500 level or above. For Track II, 3 of these hours must be at the 600 level or above.

   French students choosing applied linguistics must take French 421 or 429; 425; 512; and 9 (Track I) or 3 (Track II) hours of appropriate electives in English or French. German students choosing applied linguistics must take German 425, 435, 510, or 512, 5 hours of German language electives such as 426, 436, 631, or 632, and 6 hours of linguistics electives in English or German. Spanish students must take Spanish 421 or 429; 425; 512; and 9 (Track I) or 3 (Track II) hours of appropriate electives in English or Spanish. The student's graduate advisor must approve the electives chosen.

3. Cognate Field. Six hours in graduate coursework numbered 400 and above in a field outside the department or language family of the first concentration but related to the student's principal area of research. Students choosing applied linguistics as a second concentration are strongly urged to take their cognate work in a second language.

4. Additional requirements: For any language or linguistics taken as a first or second concentration, a student must demonstrate competence by a written examination. The test will include reading, writing, listening, and speaking, and should be completed by the time the student reaches 40 hours of study beyond the bachelor's degree. Standardized examinations that may be used for this purpose include applicable portions of either the National Teachers Examination, the MLA Examination for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI).

If a student has not chosen a third language as his or her cognate area, basic competence (determined by a reading examination with translation into English administered by the department) in a third language is required. If the student's first and second languages are Romance languages, the third language should be chosen from another language family.

For students choosing applied linguistics as an area of second concentration, reading competence in a second language is required. Competence will be determined by translation of a text from the foreign language into English. The test to be administered by the department.

A comprehensive examination on the language and literature of the first and second concentrations must be passed before the student may be admitted to candidacy. The candidate is required to defend his/her dissertation in an oral examination. Central emphasis is put on the dissertation as a final test of the candidate's scholarly qualifications.

Graduate Teaching Assistants with a second concentration in applied linguistics will be strongly encouraged to instruct in the languages of both their first and second concentration, subject to staffing needs.

Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g., Fulbright, McClure, Rotary fellowships).

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Modern Foreign Languages is available to residents of the state of Alabama. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Asian Languages

GRADUATE COURSES

431 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level Chinese or consent of instructor. May be repeated. Maximum 9 hrs.
451 Readings in Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 9 hrs.

French

GRADUATE COURSES

411 French Literature of the 16th Century (3) Highlights of 16th-century French literature. Excerpts from Rabelais and Montaigne; readings of poems from writers from Lyon and members of Pleiade. Prereq: 300-level literature course.
413 French Literature of the 18th Century (3) Major works of Enlightenment. Prereq: 300-level literature course.
416 Survey of Francophone Literature (3) Examination of French literature outside metropolitan France, particularly Africa and Caribbean. Prereq: 300-level literature course.
420 French Cinema (3) French cinema from earliest days through New Wave directors. Prereq: 300-level literature course. May apply toward major.
421 Phonetics (3) Foundation in science of phonetics. Practical exercises and individual performance. Laboratory training highly recommended. Graduate credit not allowed for departmental majors. Prereq: Intermediate Composition and Conversation or equivalent.
422 Advanced Grammar (3) Improving one's written and oral expression. Designed for students majoring in French. Prereq: Intermediate Composition and Conversation or French for Business.
423-24 Advanced Conversation (1,1) Informal conversations with native speakers on contemporary topics. Stresses oral skills in-class contact rather than outside preparation. Prereq: Intermediate Composition and Conversation or French for Business. 2 hrs weekly.
425 Introduction to Descriptive Linguistics (3) Theory and practice of techniques of linguistic analysis in subfields of phonetics, morphology, syntax, semantics, pragmatics and historical linguistics: discussion of relevance to learning and teaching of foreign languages and to study of literary texts. Recommended
561-62 French Literature of the 19th Century (3) 561-Reading and interpreting works of Hugo, Vigny, Stendhal, Balzac, Baudelaire, Flaubert, Zola, Verlaine, and others. 562-Reading and interpreting works of pre-Romantic and post-Romantic periods.

571-72 Trends in Modern French Literature (3) In-depth study of some of most revolutionary, challenging poets, novelists, dramatists of 20th century.

581-82 The French Novel (3,3) French Novel from 17th through 20th centuries.

583 Problems in Stylistics (3) Survey of comparative English-French stylistics. Development and improvement of one's written French.

584 Modern Theory and Criticism (3) Survey of twentieth century critical theory, including psychoanalysis, Marxism, structuralism and more.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/NC.

594-95 French Directed Readings (3,3)

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

621-22-23 Seminar in French Literature (3,3,3) 621-Middle Ages; 622-16th Century; 623-17th Century. May be repeated with consent of department. Maximum 6 hrs each.

631-32 Seminar in German and Germanic Philology

632-33 Seminar in French Literature (3,3) 632-19th Century; 633-20th Century. May be repeated with consent of department. Maximum 6 hrs each.

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

501 Techniques in Literary Analysis (3) Required for M.A. program. Intensive course in explication de texte, a close stylistic analysis of texts representative of different eras and of different genres.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

503-34 Seminar in German Literature (3-3) 503-10th Century; 504-11th Century; 505-12th Century; 506-13th Century; 507-14th Century; 508-15th Century; 509-16th Century; 510-17th Century; 511-18th Century; 512-19th Century; 513-20th Century. May be repeated with consent of department. Maximum 6 hrs each.

511-12 Advanced Conversation and Composition (3,3) Prerequisite: 311-12 or equivalent or consent of department.

520-21-22 Advanced Conversation and Composition (3,3) 520-10th Century; 521-11th Century; 522-12th Century. May be repeated with consent of department. Maximum 6 hrs each.

523-33 Seminar in French Literature (3,3) 632-19th Century; 633-20th Century. May be repeated with consent of department. Maximum 6 hrs each.

512 Teaching a Foreign Language (3) Critical thinking about teaching and evaluating basic language skills and foreign language skills, and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classrooms. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experiences warrant excusal by department.

516 Bibliography and Methods of Research (2) Critical research tools and bibliographical contributions in Foreign Language and Literature. Practical exercises on compiling scholarly data using computer-based and non-computer sources.


531 French Literature of the 16th Century (3) Literature of first half of 16th century. Rabalais and other prose writers, humanism, the works of Montes, Lassus, Masson, young Plácido poets.

532 French Literature of the 16th Century (3) Literature of second half of 16th century. Mature works of Plácido writers and such poets as d'Aubigné and Sponde; Montaigne; writers of scientific works and memoirists; drama.

541 French Literature of the 17th Century I (3) French poetics and prose works of 17th century.

551 French Literature of the 18th Century (3) Reading and interpreting works of Marivaux, Voltaire, Diderot, Rousseau, Beaumarchais, and others.

561 Lyric Poetry of the 19th Century (3) Reading and interpreting great French romantic poets, "l'art pour l'art" movement, Parnassians, Charles Baudelaire and Symbolists.

571-72 Trends in Modern French Literature (3,3) In-depth study of some of most revolutionary, challenging poets, novelists, dramatists of 20th century.

581-82 The French Novel (3,3) French Novel from 17th through 20th centuries.

583 Problems in Stylistics (3) Survey of comparative English-French stylistics. Development and improvement of one's written French.

584 Modern Theory and Criticism (3) Survey of twentieth century critical theory, including psychoanalysis, Marxism, structuralism and more.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/NC.

594-95 French Directed Readings (3,3)

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

621-22 Seminar in French Literature (3,3) May be repeated. Maximum 18 hrs.

631-32 Seminar in German and Germanic Philology (3,3)
**Italian**

**GRADUATE COURSES**

401 Dante and Medieval Culture (3) Introduction to significance of this great Italian writer. Prereq: 212 or consent of instructor.

402 Petrarch and Boccaccio (3) Prereq: 212 or consent of instructor.

403 Literature of the Rinascimento (3) From Pulci to Tasso, Quattrocento and Cinquecento. Prereq: 212 or consent of instructor.

405 Modern Italian Poetry (3) From Pascoli to Montale. Prereq: Italian 212 or consent of instructor.

406 The Modern Italian Novel (3) From Manzoni to Caxvino. Prereq: 212 or consent of instructor.

409 Directed Readings (3)

410 Italian Theatre (3) Survey of Italian theatre from Renaissance to present. Prereq: Intermediate Italian or consent of instructor.

421 Topics in Italian Literature and Cinema (3) Italian literature and cinema from 1930 to present focusing on literary works translated into English and adapted into film. Investigation of relationship between literature and cinema and achievement of greater understanding of Italian culture since 1930. Films in Italian with English subtitles may be repeated. Maximum 6 hrs. (Same as Cinema Studies 421.)

510 Readings in Italian Literature (3) Topics vary. May be repeated with consent of department.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

**Spanish**

**GRADUATE COURSES**

421 Phonetics (3) Prereq: Intermediate Conversation and Composition or consent of instructor.

422 Advanced Grammar (3) Finer points of grammatical structures. Required for all majors. Available to non-native speakers only. Prereq: Intermediate Composition and Grammar and minimum of 9 hrs of upper-division Spanish.

423 Advanced Conversation (3) Develops speaking skills to advanced level through wide range of activities. Available to non-native speakers only. Prereq: Intermediate Conversation and Composition, or Spanish for Business or consent of instructor.

424 Advanced Composition (3) Develops writing skills to advanced level through numerous compositions on assigned topics. Available to non-native speakers only. Prereq: 422 or consent of instructor.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Russian 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, French 426, Russian 426, and Linguistics 426.)

429 Romance Linguistics (3) (Same as French 429 and Linguistics 429.)

430 Selected Topics in Romance Literature (3) Content varies. May be repeated. Maximum 6 hrs.

451-52 Senior Seminar (3, 3) For majors in Romance; minors admitted at discretion of instructor. Intensive study of selected topics in literature and cultural studies. Topics may vary. Prereq: Aspects of Spanish and Spanish-American Literature or equivalent. May be repeated with consent of department. Maximum 6 hrs.

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and cultural and other aspects through seminars, demonstrations, discussions, observation of foreign language classes and interviews with all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

525 Communication Skills for Teachers and Other Professionals (3) Development of oral and written proficiency in Spanish through extensive use of authentic materials; class lectures and discussions; oral and written presentations and reports. Especially recommended for graduate students, teachers and other professionals seeking to maintain or enhance high level communicative competency.

531 Old Spanish (3) Evolution of Spanish language from its origins through 15th century.

533 Golden Age Prose (3) Wide range of prose fiction in Spain during 16th and 17th centuries: Moors, Picaro, sentimental, pastoral and exemplary novels, and dialogues.

534 Don Quixote (3)

535 Golden Age Poetry (3) Barcelos, Fray Luis de León, San Juan de la Cruz, Los Malditos, Cervantes, and Góngora.

537 Golden Age Drama (3) Major dramatics of period: Lope de Vega, Tirso de Molina, Rubí de Abad, Guillén de Castro, Calderón de la Barca, Moreto, and Rojas Zorrilla.

540 Eighteenth and Nineteenth-Century Spanish Literature (3) Major works from 18th- and 19th-century Spain. Content varies with regard to theme, genre or literary movement.

542 20th-Century Spanish Literature: Generation of '98 through Civil War (3) Principal achievements and representative directions in literature of Spain through Civil War years.

543 20th-Century Spanish Literature: Post-Civil War through Present (3) Principal achievements and representative directions in literature of Spain from Post-Civil War period to present.

550 Techniques of Literary Analysis and Research Methods (3) Theoretical and critical essays on various techniques and literary analysis. Exploration of bibliographical and research materials.

551 Special Topics in Spanish or Spanish American Literature (3) May be repeated. Maximum 6 hrs.

**Russian**

**GRADUATE COURSES**

401-02 Advanced Grammar, Conversation, and Composition (3, 3) Prereq: Advanced Russian Composition and Conversation or equivalent. (Same as Russian and East European Studies 401-02.)

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Spanish 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as French 426, German 426, Spanish 426, and Linguistics 426.)

430 Selected Topics in Russian Literature (3) Content varies. May be repeated. Maximum 6 hrs.

451-52 Senior Seminar (3, 3) For majors in Russian; minors admitted at discretion of instructor. Intensive study of selected topics in literature and cultural studies. Topics may vary. Prereq: Aspects of Russian and Eastern European Studies 451.

510 Russian Phonetics and Advanced Grammar (3) Russian phonetics, pronunciation, stylistics, and selected topics in Russian literature. Prereq: Conversational Russian.

550 Studies in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.