Art as (1) a minimum enrollment of 6 hours per semester and (2) use of School of Art facilities so that students are available for discussion and criticism. The candidate’s committee will consist of a minimum of 3 members and a maximum of 6 members and will be appointed prior to registration for SPS. The committee must consist of one faculty member from the candidate’s concentration area (designated as chairperson) and a faculty member from outside the concentration area. The inclusion of an Art History faculty member on each committee is encouraged.

Exhibition and oral examination: With the completion of all requirements for the M.F.A., the student must produce an exhibition and, in the presence of that work, must satisfactorily complete an oral examination.

Academic Standards
1. First-year evaluation: At the end of the first 2 semesters in residence, the student must present a portfolio for evaluation by the faculty and receive permission to continue in the program.
2. Second-year evaluation: With completion of all coursework, the student must present work for evaluation by the faculty and receive permission to register for Projects in Lieu of Thesis.
3. If, in a review by the student’s major area faculty, the student’s progress is deemed insufficient, the faculty may recommend a work period without advancement toward the degree, probation with specific goals set for a specific time, or dismissal.

GRADUATE MINOR IN THE HISTORY OF ART
A graduate minor in Art History may be arranged during the student’s first semester of study with the consent of the student’s area instructors and the Art History faculty. Students must complete a minimum of 12 hours in Art History that is agreed upon by the Art History faculty after review of previous undergraduate coursework. A reading knowledge of French, German, or Italian is a prerequisite, unless waived by the Art History faculty. Graduate Council policy stipulates that a member from the minor unit must serve on the thesis committee.

Art
GRADUATE COURSES
481 Museology I: Museums, Purpose and Function (3) Development of museums of art, history, and applied science. (Same as Anthropology 481.)
482 Museology II: Exhibition Planning and Installation (3) Exhibition planning and implementation. Exhibition design and installation techniques. Publicity, production, matting and framing, shipping and storage. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)
484 Museology III: Field Projects (1-12) Special field projects: restoration, preservation, registration, and other related research on or off campus. Prereq: 481 and 482 or consent of instructor. (Same as Anthropology 484.)
499 Special Topics (3) Student- or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.

502 Registration for Use of Facilities (1-15) 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.
507 Professional Practices: Teaching Internship (1) Individual study in development of skills and methodology in teaching studio courses. For students who are not GTAs. Prereq: Consent of instructor. May not be used toward degree requirements. May be repeated. S/NC only.
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. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.

Art Ceramics
GRADUATE COURSES
429 Ceramics: Special Topics (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
521 Graduate Ceramics I (2-5) May be repeated. Maximum 10 hrs.
525 Graduate Ceramics II (2-5) May be repeated. Maximum 10 hrs.
593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Design/Graphic
GRADUATE COURSES
405 Computer Enhanced Graphic Design (3) Exploration of new technologies and their significance to graphic design. Prereq: 351 Intermediate Graphic Design I, 356 Graphic Design Production with a grade of C or better and consent of instructor. May be repeated. Maximum 12 hours.
451 Advanced Graphic Design (3) Theory and techniques of visual problem-solving as applied to advanced applications of graphic design. Prereq: Intermediate Graphic Design II with a grade of C or better.
452 Graphic Design Seminar (3) Discussion of design and professional issues: politics, economics, and ethics for graphic designer. Culminates in student-initiated project. Prereq: 451 with a grade of C or better.

545 Advertising Illustration (3) Media and techniques as applied to advertising illustration. Prereq: Black and White Illustration and successful completion of any portfolio review.
544 Editorial Illustration (3) Media and techniques as applied to editorial illustration for books, magazines, and newspapers. Prereq: Black and White Illustration and successful completion of any portfolio review.
546 Graphic Design Practicum (3-12) Practical work experience in graphic design field. Only by prior arrangement with department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
549 Special Topics in Graphic Design (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
550 Studies in Graphic Design/Illustration History (3) Design and illustration ca. 1850 to present. Prereq: M.F.A. candidate or consent of department. May be repeated. Maximum 6 hrs.
551 Graphic Design I (2-6) May be repeated. Maximum 10 hrs.
552 Graphic Design II (2-6) May be repeated. Maximum 10 hrs.
553 Computer Enhanced Design (2-6) Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.
593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Drawing
GRADUATE COURSES
419 Special Topics in Drawing and Painting (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
511 Graduate Drawing I (2-6) May be repeated. Maximum 10 hrs.
512 Graduate Drawing II (2-6) May be repeated. Maximum 10 hrs.
593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art History
GRADUATE COURSES
403 History of Photography (3) Survey of history of photography from introduction of daguerreotype and calotype to more recent trends. Aesthetics and use of photography as medium for artistic expression.
411 Art of South and Southeast Asia (3) Survey of art and architecture of Indian subcontinent and Southeast Asia from 200 B.C. to 20th century. Major achievements of each period in religious, political, and social contexts.
Art

415 Art of China (3) Survey of art and architecture of China from neolithic period to 20th century. Major achievements of each period in religious, political, and social contexts.

416 Chinese Art of the 20th and 21st Centuries (3) Survey of Chinese art since the collapse of the Qing dynasty through the present. Honk Kong, Taiwanese, and expatriate artists are also considered.

419 Art of Japan (3) Survey of art and architecture of Japan from neolithic period to 20th century. Major achievements of each period in religious, political, and social contexts.

425 Early Christian and Byzantine Art to 1350 (3) Art in Italy and the Eastern Empire from the beginnings of Christian art to c. 1350. Mosaic and painting, sculpture and architecture. (Same as Judaic Studies 425.)

431 Medieval Art of the West, 800-1400 (3) Western European art of the "Dark Ages," Romanesque, and Gothic periods. Writing-emphasis course. (Same as Judaic Studies 431.)

441 Northern European Painting, 1350-1600 (3) From courtly art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, and Durer; early printmakers. Writing-emphasis course.

442 Art of Northern Europe, 1600-1675 (3) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de la Tour, Vermeer, Poussin, and Hals. Writing-emphasis course.


453 Art of Southern Europe, 1575-1700 (3) Concentrated study of Caravaggio, Bernini, and Italian Baroque developments in all media. Spanish Baroque painting and sculpture: Velazquez. Writing-emphasis course.

454 Renaissance and Baroque Theory (3) Theory of Western art in early modern period: development and evolution in European Art during Renaissance and Baroque periods. Prereq: 172 and 173 Western Art, or consent of instructor.

461 Art of Southern and Eastern Africa (3) Art traditions of eastern and southern regions of Africa. Sculpture, painting, pottery, textiles, architecture and human adornments from ancient Stone and Iron Age traditions. Diverse ethnic and regional art traditions practiced in the area from 19th century to present. (Same as African and African American Studies 461.)

462 Art and Archeology of Ancient Africa (3) Historical art traditions of sub-Saharan Africa. Prehistoric rock paintings; art from archaeological sites and ancient kingdoms. First and second millennia B.C. for early terracotta sculpture and rock paintings, 11th through 19th centuries A.D. for later ancient kingdoms. (Same as African and African American Studies 462.)

463 Arts of the African Diaspora (3) Aesthetic, religious and philosophical themes of African American art from the Caribbean and United States. Full range of art forms: sculptural and performative traditions, architecture, textile, basketry and pottery art forms. (Same as African and African American Studies 463.)

471 History of North American Art (3) Landmarks in painting, architecture, sculpture, and design from prehistory to 1900.

472 History of 20th-Century American Art (3) Developments in architecture, painting, and design from 1900.

473 19th-Century American Painting (3) From West and Copley to emergence of "The Eight."

474 Theory of 20th-Century Art in Europe and America (3) Theoretical basis for modern movement. Analysis and discussion of individual works of art in light of contemporary writings by artists and theorists. Prereq: Western Art I and II, or consent of instructor.


476 History of 20th-Century Painting and Sculpture in Europe (3) Development of Modern and Post-Modern movements in Europe. Investigation of progression of abstraction through more recent conceptual trends. Analysis of work of individual artists such as Picasso, Matisse, and others.

479 Special Topics in Art History (3) Student- or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.

483 History of American Sculpture (3) American sculpture from prehistory to 1965.

485 History of Printmaking (3) Prints from 15th century to present. 20th century in Europe and U.S. Prereq: 172 and 173.

489 Studies in Art History (3) Concentration in individually selected area. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

571 Studies in Medieval Art (3) Art and architecture of Middle Ages: major monuments from Byzantine or western Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

572 Studies in Italian Renaissance Art (3) Art and architecture of 14th, 15th, and/or 16th centuries in Italy. Early or High Renaissance or Mannerist periods. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

573 Studies in Baroque Art (3) 17th-century art and architecture: major artists and works from southern or northern Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

574 Studies in Modern Western Art (3) Selected topics in 19th- and 20th-century western art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

575 Studies in Modern American Art (3) Selected topics in 19th- and 20th-century American art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

576 Studies in Asian Art (3) Selected topics in Japanese Chinese Art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

579 Special Topics in Art History (3) Student- or instructor-initiated course offered at convenience of department. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

438 Special Topics in Media Arts (3) Student- or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.

441 Digital Photography II (4) Continuation of exploration and implications of use of computer in photography. Prereq: Digital Photography I and consent of instructor.

442 Large Format Photography II (4) Studio course that continues exploration of use of large format camera in photography. Prereq: Large Format Photography I and consent of instructor.

531 Photography I (2-6) May be repeated. Maximum 10 hrs.

532 Photography II (2-6) May be repeated. Maximum 10 hrs.

535 Media Arts I (2-6) May be repeated. Maximum 10 hrs.

536 Media Arts II (2-6) May be repeated. Maximum 10 hrs.

537 Studies in Media as Art (3) Selected topics in theory and history of media as art form. May be repeated. Maximum 9 hrs.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (3) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 12 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Painting

GRADUATE COURSES

413 Painting IV (6) Advanced painting; individual concepts and personal expression with varied media. Prereq: Painting III. May be repeated. Maximum 12 hrs.


419 Special Topics in Drawing and Painting (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

513 Graduate Painting I (2-6) May be repeated. Maximum 10 hrs.

514 Graduate Painting II (2-6) May be repeated. Maximum 10 hrs.

515 Graduate Watercolor I (2-6) May be repeated. Maximum 10 hrs.

516 Graduate Watercolor II (2-6) May be repeated. Maximum 10 hrs.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Media Arts

GRADUATE COURSES


433 History of Film and Modern Art (3) Study of development and interaction between cinematic arts and visual arts within context of modern art history. Available for Art History credit. (Same as Cinema Studies 433.)

435 Cinematography as Art (3) Continued development of concepts and techniques of creation of film as art form: individual projects. Prereq: Introduction to Cinematography as Art and Media Arts Portfolio Review or consent of instructor. May be repeated. Maximum 9 hrs.

436 Video Art (3) Continued development of concepts and techniques for creation of video works as art form: individual projects. Prereq: Introduction to Cinematography as Art and Media Arts Portfolio Review or consent of instructor. May be repeated. Maximum 9 hrs.
Art Printmaking

GRADUATE COURSES

462 Intaglio III (3-6) Exploration of individual projects through advanced color printing methods and combinations with other print media. Prereq: Intermediate Intaglio or consent of instructor. May be repeated. Maximum 12 hrs.

463 Lithography III (3-6) Exploration of individual projects through advanced lithographic methods in combination with other print media. Prereq: Intermediate Lithography or consent of instructor. May be repeated. Maximum 12 hrs.

464 Screen Printing III (3-6) Individual development of screen printing problems and techniques: development of image and personal concept. Prereq: Intermediate Screen Printing or consent of instructor. May be repeated. Maximum 12 hrs.

469 Special Topics in Printmaking (3-6) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.

501 Printmaking I (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo-print methods and monoprint. May be repeated. Maximum 10 hrs.

502 Printmaking II (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo-print methods and monoprint. Prereq: 561.

503 Printmaking III (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo-print methods and monoprint. Prereq: 561, 562.

504 Printmaking IV (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo-print methods and monoprint. Prereq: 561, 562, 563.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Sculpture

GRADUATE COURSES

441 Advanced Sculpture (3-6) Individual development of sculptural problems and techniques. Students work independently while participating in group projects, critique, and discussion. Prereq: 6 hours of 300 level sculpture. May be repeated. Maximum 12 hrs.

449 Special Topics in Sculpture (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Successful completion of any portfolio review. May be repeated. Maximum 12 hrs.

541 Graduate Sculpture I (2-6) May be repeated. Maximum 10 hrs.

542 Graduate Sculpture II (2-6) May be repeated. Maximum 10 hrs.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Audiology and Speech Pathology

(College of Arts and Sciences)

MAJORS DEGREES

Audiology ........................................... Au.D.
Speech and Hearing Science ............. Ph.D.
Speech Pathology .............................. M.A.

Ilsa Schwarz, Head

Professors:
Asp, Carl W., Ph.D. ....................... Ohio State
Nabelek, Anna, Ph.D. ..................... Poland
Schwarz, Ilsa, Ph.D. ...................... Oregon

Associate Professors:
Burchfield, Samuel B., Ph.D. .......... Michigan State
Hedrick, Mark, Ph.D. ...................... Vanderbilt
Payne, Pearl A., Ph.D. ................. Tennessee
Swanson, Lori A., Ph.D. ............... Purdue
Thelin, J. W., Ph.D. ....................... Iowa

Assistant Professors:
Erickson, Mary L., Ph.D. ............. Southern Cal
Filipsen, Peter, Ph.D. ..................... Wisconsin
Harkrider, Ashley, Ph.D. .............. Texas
Horton-Ikard, RaMonda, Ph.D. ....... Wisconsin
Munoz, Maria, Ph.D. ..................... Texas

Clinical Director:
Michael, Ann, Ph.D. ....................... Vanderbilt

Clinical Faculty:
Barnes, Vickie, M.A. ..................... Tennessee
Beltler, Julie, M.A. ....................... Tennessee
Buehler, Velvet, M.A. ..................... Tennessee
Christopher, Kimberly, M.A. ........ Tennessee
DeGennaro, Andrea, M.A. .......... Case Western
Dungan, Jan, M.A. ......................... Tennessee
Edick, Lisa, M.A. ......................... Texas
Genone, Laura, M.A. ..................... Tennessee
Hume, Sue, Ph.D. ......................... Tennessee
Hutself, Gayla, M.A. ..................... Tennessee
Jenkins, Kimberly, M.A. ............. Tennessee
Johnston, Kristi, M.A. .................. Tennessee
Lewis, Dee, M.A. ........................ Tennessee
Powell, Pam, M.A. ....................... Tennessee
Schuy, Nancy, M.A. ...................... Tennessee
Searfoss, Marianne, M.A. .......... Tennessee
Sheridan, Carol, M.A. ................. Tennessee
Simpson, Leigh, M.A. .................. Tennessee
Singletary, Theronne, M.S. .......... Colorado State
Thomason, Tanya, M.A. .............. Tennessee
Valentine, Dan, M.A. ................... Tennessee
Vaugh, Teresa, M.S. ..................... Eastern Kentucky
Ward, Tracey, M.S. ...................... East Tennessee State
Webb, Patricia, M.Ed. ................. Florida
Yeager, Kelly, B.S. ...................... South Alabama

THE MASTER’S PROGRAM IN SPEECH PATHOLOGY

A major is offered in Speech Pathology. Admission to this graduate program is competitive. This graduate program is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association. The master’s degree program in speech pathology is a two-year program and consists of the completion of 42 semester hours of academic content courses (including thesis) plus practicum. A minimum of three academic courses must be completed during all semesters (terms) except one. That is, students must take a minimum of nine semester hours of academic courses for at least four semesters or terms and six semester hours in the other semester or term. The required courses are 506, 511, 526, 561, 582, 539 or 541, 520 or 524, and at least two seminars from the following courses: 522, 523, 531, 628, or 661 and at least 15 hours of elective courses. Undergraduate coursework may not be substituted for seminar courses. Students who have not completed an undergraduate course in each of the following three areas—articulation/phonological processing disorders, voice disorders, and fluency disorders—must complete one graduate course in each of the three areas.

Students majoring in speech pathology may elect either the thesis or non-thesis option. The master’s program in speech pathology with thesis includes six hours of 500 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. Students in the non-thesis option must pass a final written examination.

Graduate students in both Audiology and Speech Pathology may elect to pursue a concentration in the area of aural habilitation.
Admission to the aural habilitation concentration is competitive and applications will be processed during the first year of graduate study. The concentration requires: (1) Three semesters of clinical practicum in treatment of children who have hearing impairments, totaling a minimum of 130 clock hours, and (2) completion of 6 hours of graduate level courses in language, audiology, and/or aural habilitation. Specific requirements are outlined in the Graduate Handbook for Audiology and Speech-Language Pathology, as well as on the Departmental web site (http://web.utk.edu/~aspweb/).

DOCTORAL PROGRAMS

The Doctor of Audiology (Au.D.) program is designed to prepare individuals for professional careers in audiology. The degree program is clinically oriented, with primary emphasis on processes involved in hearing, vestibular function, and communication. The program is designed to meet the entry-level requirements for the practice of audiology established by the Council on Academic Accreditation of the American Speech-Language-Hearing Association.

Students will be expected to demonstrate competencies in the following areas:

1. Prerequisite knowledge and skills for the practice of audiology.
4. Evaluation of auditory, vestibular, and related communication disorders.
5. Treatment of auditory, vestibular, and related communication disorders.

The program will normally consist of four calendar years of study beyond the baccalaureate degree with the first three years being devoted primarily to formal coursework, and the last year to a full-time externship in the practice of clinical audiology.

The program is a minimum of 112 semester hours, including a minimum of:

1. 67 semester hours of academic coursework at the 500- and 600-levels.
2. 3 semester hours of directed research in audiology, vestibular, or related communication disorders.
3. 24 semester hours of clinical practice in audiology.
4. 18 semester hours of externship in audiology (6 hours per semester for 3 semesters).
5. A comprehensive examination.

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for professional careers in a variety of positions including research and college teaching in the concentration areas of speech and language pathology, audiology, speech-language science or hearing science. The degree program is research oriented with primary emphasis on processes involved in normal, or disordered speech, language and hearing. Students will be expected to demonstrate their knowledge in areas related to the concentrated field of study. These areas include:

1. Basic speech, hearing, or language processes;
2. Basic speech, hearing, or language disorders or differences;
3. Related disciplines providing insight into human communication processes;
4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

The program will normally consist of three or more calendar years of graduate study beyond the master’s degree with the first year being devoted primarily to formal coursework and the last year to full-time research culminating in the doctoral dissertation.

The total program is a minimum of 60 semester hours, including a minimum of:

1. 24 semester hours in dissertation 600.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department of which:
   a. a minimum of 6 semester hours in the topic of major interest;
   b. a minimum of 6 semester hours in topic(s) of related interest;
   c. 3 semester hours in 611; and
   d. 3 semester hours in supervised teaching experience.
5. A comprehensive examination to demonstrate knowledge in the concentration area and an examination of research competence.
6. A final oral examination.

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 300 Introduction to Communication Disorders or consent of instructor.

433 Observation of Clinical Practice (1) Prereq: 320 Speech and Language Development or consent of instructor.

434 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 433 and consent of instructor. Enroll for fewer than 2 hrs must have prior departmental approval.

435 Introduction to Speech Sound Disorders (3) Etiology, diagnosis, and treatment of articulatory and phonological disorders. Prereq: 300 Introduction to Communication Disorders, 305 Phonetics, or consent of instructor.

440 Voice Disorders (3) Etiology, diagnosis, and treatment of organic and functional voice disorders. Prereq: 300 Introduction to Communication Disorders, 306 Anatomy and Physiology of Speech, or consent of instructor.

455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.


473 Introduction to Audiologic Assessment (3) Basic principles of clinical audiology; pure tone, speech, masking and overview of special auditory tests. Prereq: 300 and consent of instructor.

475 Appraisal of Speech and Language Disorders (3) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Prereq: 300 Introduction to Communication Disorders and consent of instructor.

494 Aural Habilitation/Rehabilitation of the Hearing Impaired (3) Psychosocial aspects, amplification components/characteristics, assistive devices, speech acquisition, speech perception, speech reading, parent-infant, preschool school years of children, communication impairments/handicaps/remediation of adults, effects of aging/remediation on the elderly, and case studies. Prereq: 305 Phonetics and 473 or equivalent or consent of instructor.

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

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for the time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only.

506 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems, role in speech and language. Prereq: 306.

507 Anatomy and Physiology of Hearing (3) Structure and function of the peripheral and central auditory systems, and their roles in mediating auditory processes. Prereq: 473 or equivalent or consent of instructor.

511 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, fundamentals of statistics, application of statistics, and completion of a proposal and hypothesis for a pilot research project.

512 Clinical Practice in Audiology (1-4) Coreq: 546. May be repeated. Maximum 24 hrs.

517 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation in audiology and speech pathology; laboratory assignments for familiarization of students with instruments for measuring speech and hearing processes.

520 Aphasia (3) Historical review of aphasia literature, theories of brain functioning, aphasic classification and terminology, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 506 or equivalent or consent of instructor.

522 Seminar in Articulation and Phonological Processing Disorders (3) Current research in diagnosis and management of articulation and phonological processing disorders. Prereq: 435 or equivalent or consent of instructor.

523 Seminar in Voice Disorders (3) Current research in diagnosis and management of voice disorders. Multicultural, gender and age-related issues. Prereq: 440 or consent of instructor.

524 Traumatic Brain Injury (3) Advanced neurogenics: cognitive-linguistic emphasis. Medical and speech-language pathology rehabilitation issues associated with traumatic brain injury (TBI) related to adult TBI population. Prereq: 506 and 520, or consent of instructor.

526 Dysphagia (3) Clinical diagnosis, evaluation, and treatment of adult swallowing disorders and critical interpretation of research literature on dysphagia. Prereq: 506 or consent of instructor.

531 Seminar on Stuttering (3) Current significant research in stuttering. Prereq: 431 or consent of instructor.

533-534 Advanced Clinical Practice in Speech-Language Pathology (1-4, 1-4) Prereq: 434 or equivalent or consent of instructor. May be repeated. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.

535-356 Advanced Clinical Practice in Speech-Language Pathology: Off-Campus Sites (1-4, 1-4) Prereq: 100 hrs clinical experience, consent of instructor. May be repeated. Maximum 6 hrs each. Enrollment for less than 2 semester hrs must have prior departmental approval.

538 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-4) May be repeated. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.
539 Motor Speech Disorders (3) Neuromotor organization for speech production; types of motor speech disorders and associated neuromuscular symptoms; diagnosis and management of motor speech disorders. Prereq: 506.

540 Structural Speech Disorders (3) Etiology, diagnosis and clinical management of craniofacial speech disorders and laryngeotomy. Prereq: 306 Anatomy and Physiology of Speech and 435.

541 Pediatric Oromotor Disorders (3) Evaluation, diagnosis and treatment of pediatric oromotor disabilities that affect normal acquisition of feeding and preverbal speech skills. Prereq: 506 or consent of instructor.

542 Hearing Disorders (3) Effects of heredity, development, aging, and diseases on hearing. Prereq: 473 or equivalent or consent of instructor.

543 Amplification Technology (3) Description of hearing aid circuits, components and performance characteristics. Electroacoustical and real-ear analysis of hearing aids. Coupler material and geometry effects. Practical experience in troubleshooting, repair, and construction of hearing aids. Prereq: 473 and 507 or equivalents or consent of instructor.

544 Amplification for Adults with Hearing Impairment (3) Speech acoustics/psychoacoustics. Influence of hearing loss on speech perception and auditory pathology on speech perception. Strategies for selecting amplification. Psychological considerations, Orientation and counseling, Discontinuation models, Prereq: 473, 507, 543 and 543 or equivalents or consent of instructor.

545 Sound Measurement Techniques and Hearing Conservation (3) Techniques of measurement and analysis of sound: hearing conservation in schools and industry. Prereq: Consent of instructor.

546 Audiologic Assessment (3) Theoretical bases for behavioral audiometry and acoustic immittance measurement.

547 Special Problems in Audiology (1-3) Prereq: 473 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs.

552 Seminar in Speech Pathology (2-3) Current research in speech pathology. Prereq: 507 or consent of instructor. Prereq: 9 hrs in speech pathology. May be repeated with consent of department. Maximum 9 hrs.

555 Special Problems in Speech-Language Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

556 Independent Study in Speech-Language Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

558 Phonological Disorders (3) Current theories and approaches to assessment and intervention for individuals acquiring or using a sound system of English. Prereq: 435 or equivalent or consent of instructor.

561 Child Language Disorders (3) Current literature on assessment and intervention techniques for young language learners. Prereq: 461 or equivalent or consent of instructor.

563 Language Disorders: Birth to Three (3) Overview of family-focused, transdisciplinary intervention process. Assessment/treatment of infants, toddlers, and preschoolers. Description of disabilities and resulting communication disorder. Prereq: 461 or equivalent or consent of instructor.

574 Pediatric Audiology (3) Theoretical and practical considerations in evaluation and treatment of hearing loss in infants and children. Audiological intervention in case management of hearing impaired child: amplification, educational alternatives, and state and federal guidelines.

576 Physiologic Assessment of the Auditory System (3) Otoacoustic, electrophysiological, and auditory brainstem responses. Anatomical origins, principles, and applications. Use of these responses in infant and child audiology function and determination of site-of-lesion. Prereq: 507, and 546, or equivalents, or consent of instructor.

577 Vestibular Disorders (3) Anatomy, physiology, and pathophysiology of vestibular system and other systems that contribute to balance. Practicum in electroyntomography. Prereq: 507, 542, 546, and 576, or equivalents, or consent of instructor.

581 Assessment of Central Auditory Processing (3) Overview of current central auditory processing disorder (CAPD) literature and assessment procedures, with emphasis on a holistic view by combining perceptual, electrophysiological, linguistic, and cognitive measurements. Prereq: 546, 574, and 594, or equivalents or consent of instructor.

582 Speech and Language Services in School (3) Organization and distribution of speech and language programs in schools.

583 Physiologic Assessment of the Auditory System II (3) Middle-latency, long-latency, and event-related potentials. Neuropsychiological mechanisms, principles, and applications. Use of these principles in evaluation of neurological and cognitive function. Prereq: 576 or equivalent or consent of instructor.

584 Amplification for Children with Hearing Impairment (3) Study of strategies for selecting and fitting amplification systems for children: outcome measures and service coordination. Prereq: 543, 544, and 574 or equivalents or consent of instructor.

585 Cochlear Implants (3) Overview of cochlear implants, focusing on theory of auditory stimulation and cochlear implant systems; candidacy, surgical preparation, and follow-up/outcome measures; the rehabilitation process; and cochlear implant case presentations. Prereq: 507, 576, and 583 or equivalents or consent of instructor.

586 Standards and Practice Issues in Audiology (3) Overview of professional practice standards, ethics, medical/legal issues, business practices, and reimbursement models. Prereq: 512 or equivalent or consent of instructor.

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.

594 Advanced Aural Habilitation/Rehabilitation of the Hearing-Impaired (3) Study of grieving process, counseling, group and individual amplification systems, classroom/speech acoustics, central auditory problems, therapy methods for habilitation and rehabilitation, speech reading, school-based programs, programs for adults and the elderly; student research reports/case studies. Prereq: Phonetics and Acoustics of Speech, 473 and 494 or equivalents or consent of instructor.

595 The Verbotonal System: Auditory/Speech Perception (3) Innovative therapy, speech procedures, and SIVAG amplification/filters for diagnosis/evaluation/remediation of spoken language/listening skills of hearing-impaired children/ adults: use of rhythm, movements and suprasegmentals; special audiomeric tests, acoustic filters, correcting misarticulations of foreign language: foreign language: second (foreign) language through listening/spoken language; relationship of concepts to conventional practice; student research reports. Prereq: 305 Phonetics, 473, 494 or equivalents or consent of instructor.

600 Doctoral Research and Dissertation (1-15) Preregis.

601 Experimental Phonetics (3) Acoustical and perceptual analyses of speech production and overall communicative function. Prereq: 473 or equivalent or consent of instructor.

602 Psychoacoustics (3) Auditory perception and reception of nonspeech and speech stimuli. Prereq: 507 and 610, or equivalents, or consent of instructor.


609 Seminar in Speech Science (2) Experimental areas: speech pathology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement of speech and language. Topics vary. Prereq: 601 or consent of instructor. May be repeated. Maximum 6 hrs.

610 Seminar in Hearing Science (3) Advanced study of perception of nonspeech acoustic signal, detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 507 and 546 or equivalents or consent of instructor. May be repeated. Maximum 6 hrs.

611 Experimental Design in Speech and Hearing (3) Analysis of experimental design in theses and dissertations. Prereq: 507, 546, or consent of instructor. May be repeated. Maximum 6 hrs.

612 Advanced Seminar in Neurologically-based Communication Disorders (3) Topics vary. Prereq: 546, 524, or consent of instructor. May be repeated. Maximum 6 hrs.

650 Advanced Seminar in Audiology (3-6) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

652 Advanced Seminar in Speech and Language (2) Topics vary: aberrations of voice, articulation, speaking time and rhythm, language development or use, and language symbolization. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

655 Practicum in College Teaching (1-3) Supervision and experience in college teaching. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

656 Directed Research (1-4) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

657 Directed Study in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

658 Directed Study in Audiology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

659 Directed Study in Speech Science (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

660 Directed Study in Hearing Science (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

661 Advanced Seminar: Language Disorders in Children (3) Topics vary. Prereq: 561 or consent of instructor. May be repeated. Maximum 6 hrs.

681 Seminar in Hearing Science (1-3) Advanced study of perception of nonspeech acoustic signal, detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 507 and 546 or equivalents or consent of instructor. May be repeated. Maximum 6 hrs.

682 Seminar in Communication Disorders (1-3) Analysis of experimental design in theses and dissertations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

683 Seminar in Neurologically-based Communication Disorders (3) Topics vary. Prereq: 546, 524, or consent of instructor. May be repeated. Maximum 6 hrs.

684 Seminar in Speech Science (3) Experimental areas: speech pathology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement of speech and language. Topics vary. Prereq: 601 or consent of instructor. May be repeated. Maximum 6 hrs.

Aviation Systems

MAJOR

DEGREE

Aviation Systems .................................................. M.S.

Frank G. Collins, Co-Chair
Ralph D. Kimberlin, Co-Chair

Professors:
Collins, F. G., Ph.D. ....................... California
Kimberlin, R. D. (Liaison), Ph.D. ............... RWTH (Germany)

Associate Professor:
Sollie, U. P., Ph.D. ........................... Tennessee

Research Assistant Professor:
Stellar, Frederick W., M.S. .......... Georgia Tech
Emeriti Faculty:
Mason, A. A., Ph.D. ......................... Tennessee
Paludan, C. T., Ph.D. ....................... Denver
Wu, J. M., Ph.D. ............................. Cal Tech
Young, R. L., Ph.D. ....................... Northwestern
The University of Tennessee Space Institute offers a program leading to the Master of Science degree with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a bachelor’s degree in engineering or science and wish to study under a “system philosophy” toward careers in research and development or administration in areas pertinent to aviation. Current emphases include flight testing, aircraft design, aviation meteorology, air traffic control, and airport management.

To qualify for admission to this program, the applicant must possess a bachelor’s degree in engineering or science from an accredited institution, show evidence of ability to pursue and benefit from the program, and fulfill The University of Tennessee Graduate Admission procedures and grade-point standards. It is expected that the student will have a basic knowledge of computer utilization and statistics; an understanding of aerodynamic fundamentals, aircraft propulsion, and performance; and some understanding of economics.

Both thesis and non-thesis programs are available. The thesis program involves a minimum of 30 semester hours credit while the non-thesis program involves a minimum of 33 semester hours credit. Both options are fully supported off-campus utilizing electronic media for videotaping and interactive distance teaching methods.

**THESIS OPTION**

The thesis program involves satisfactory completion of the following requirements:

**Research and Development Specialization**

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Six hours in industrial engineering (engineering management).
3. Six hours of electives from the major field, mathematics or engineering.
4. Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.

**Administration Specialization**

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Three hours in industrial engineering (engineering management).
3. Three hours in economics or finance.
4. Twelve hours of electives in the major field, mathematics or engineering.
5. Three hours of an assigned project under Aviation Systems 550.

A comprehensive final written examination on all coursework submitted for the degree and defense of the project course paper.

**GRADUATE COURSES**

### 500 Series (1-15) P/NP only.

**501 Aviation Systems: An Overview**

- Three hours in industrial engineering (engineering management).
- Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.
- Defense of thesis and completion of final exam.

**502 Registration for Use of Facilities**

- Four hours of an assigned project under Aviation Systems 550.

**503 Air Vehicles**

- Three hours in industrial engineering (engineering management).
- Six hours of electives from the major field, mathematics or engineering.
- Three hours in economics or finance.
- Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.
- Defense of thesis and completion of final exam.

**Governmental Policies for Aviation (3)**

- Three hours in industrial engineering (engineering management).
- Three hours in economics or finance.
- Six hours of electives selected from the major field, mathematics or engineering.
- Three hours in economics or finance.
- Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.
- Defense of thesis and completion of final exam.

**Non-Thesis Option**

The non-thesis program will be permitted in special circumstances and involves satisfactory completion of the following requirements:

**Research and Development Specialization**

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Six hours in industrial engineering (engineering management).
3. Twelve hours of electives in the major field, mathematics or engineering.
4. Three hours of an assigned project under Aviation Systems 550.
5. A comprehensive final written examination on all coursework submitted for the degree and defense of the project course paper.

**Graduate Courses**

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

501 Aviation Systems: An Overview (3) Aviation systems, present and future. Socioeconomic base, aerospace and propulsion technology, meteorology, air traffic control, airport community interface, and technological trends and developments pertinent to present status and future development of air transportation.

502 Registration for Use of Facilities (1-15)

Requisite 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.

503 Air Vehicles (3) Current capabilities and future requirements for civilian and military air vehicles. Parameters significant for aircraft vehicle type selection. Integration of air vehicle into aviation systems.

504 Airports and the Community (3) Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling. Airport management, economics and logistics. Interfaces with community. Plans, programs and developments for collecting and distributing passengers and freight from airports. Types of airport developments and their projections.

505 Governmental Policies for Aviation (3)

Theoretical and legal basis for economic and governmental regulation of aviation. Historical and legislative development of aviation regulatory agencies, organizational structure, administrative and enforcement procedures.

506 Aircraft Design (3)

Design process, compromise of conflicting requirements, economical, industrial and legal aspects. Definition of mission requirements, synthesis and optimization techniques, safety and reliability, system integration, standards and regulations, teamwork and decision-making process.

507 Introduction to Airborne Radar (3) Application of airborne radar. Radar detection and measurement techniques through aviation systems applications. Ground effects on radar signals of multipath and clutter. Pulsed operation, coding, filters, processing techniques, Doppler effects. Problems of range and range rate and tracking. Methods and techniques for reducing radar cross section.

508 Flight Test Instrumentation (3) Principles of measurement, measuring devices with views toward both ground and flight aerospace testing: measurement fundamentals, sensors for specific parameters (e.g., temperature, heat flux, flow rate, pressure, acceleration, vibration, strain, and humidity), data bus integration, signal condition, telemetry, and fabrication.
Biochemistry and Cellular and Molecular Biology

(College of Arts and Sciences)

MAJOR DEGREES

Biochemistry and Cellular and Molecular Biology ............... M.S., Ph.D.

Bruce D. McKee, Head

Professors:

Becker, J. M., Ph.D. ......................... Cincinnati
Ganguly, R., Ph.D. ......................... Nebraska
Handel, Mary Ann (Distinguished Professor), Ph.D. .................. Kansas State
Howell, E. W., Ph.D. ......................... Lehigh
Jeon, K. W., Ph.D. ............................. Oxford
Joy, D. C. (Distinguished Scientist), Ph.D. ........................... London
Koontz, John W., Ph.D. ....................... Kentucky
Monty, K. J., Ph.D. .......................... Rochester
Peterson, C. B., Ph.D. ........................ LSU
Roberts, D. M., Ph.D. ........................ California (Davis)
Serpersu, E. H., Ph.D. ........................ Hatecepe

Associate Professors:

Bruce, B., Ph.D. ................... California (Berkeley)
Hall, J. C., Ph.D. ....................... Illinois
Prosser, R. A., Ph.D. ...................... Illinois

Assistant Professors:

Dealwis, C., Ph.D. ............................... London
Fernandez, E., Ph.D. ....................... Loyola
Guo, H., Ph.D. ............................... Harvard
Jain, N., Ph.D. ............................... Brandeis
Park, J., Ph.D. ............................... Texas A&M

Research Professors:

Allison, D. P., M.S. .................... Tennessee
Hartman, F., Ph.D. ....................... Tennessee
Mazur, Peter, Ph.D. ....................... Harvard

REQUIREMENTS FOR ADMISSION

Applicants for graduate study are expected to have a background equivalent to that required of undergraduate majors in this department. This includes a knowledge of the basic principles of biochemistry, cell biology, genetics and physiology. Requirements for admission are:

1. One year of general biology or the equivalent;
2. A minimum of 8 semester hours of approved biology courses beyond the introductory level and including the subject areas of genetics, cell biology and physiology;
3. Two years of chemistry including one year of general chemistry and one year of Introductory Organic Chemistry with laboratory;
4. At least one semester of biochemistry;
5. One year of calculus;
6. One year of physics;
7. Graduate Record Examination scores; and
8. A minimum grade-point average of 3.0 out of 4.0.

Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department’s Graduate Recruiting Committee.

THE MASTER’S PROGRAM

1. Biochemistry and Cellular and Molecular Biology 511-12-13, 515-16, and 517.
2. Completion of course requirements as determined by the candidate’s faculty committee.
3. Achievement of a 3.0 or better GPA in all courses taken for graduate credit.
4. Participation in 601 and 603 during the entire period of residence. Participation in at least one journal club chosen from among 605-608 for three semesters.
5. Six hours of master’s research and a thesis.
6. A final examination that covers both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

1. Biochemistry and Cellular and Molecular Biology 511-12-13, 515-16, and 517.
2. At least two additional approved graduate courses in the life sciences or chemistry, or physics, or other physical science to be determined upon consultation with the mentor and the dissertation committee. No survey courses will be accepted.
3. At least 6 hours of topics offered in 615 or its equivalent.
4. Participation in 601 and 603 during the entire period of residence. Participation in at least one journal club chosen from among 605-608 for six semesters.
5. Comprehensive examination, taken before the end of the third year of study.
6. A dissertation reporting the results of original and significant research carried out during the term of candidacy.
7. A final oral examination which will be concerned primarily with the student’s dissertation.

Petitioning for Master’s Degree

Students who have passed the comprehensive examination in the Ph.D. program and have completed at least 30 hours of approved coursework for graduate credit, at least two thirds of which must be at or above the 500 level, may petition the department for award of a master’s degree. The additional requirements for such a degree are:

1. The preparation of a research manuscript suitable for submission for publication in a major scientific journal and oral defense of that manuscript before an examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department; or
2. Publication of at least one full-length paper in a major scientific journal as senior author.

GRADUATE COURSES

401-402 Biochemistry-Molecular Biology I, II (4,4)
401—Amino acid structure and chemistry, protein structure and chemistry, protein folding, enzyme behavior and function, reaction mechanisms, catabolism and energy transfer, synthetic metabolism including photosynthesis, and protein transport. 402—Structure of DNA and RNA, experimental methods of analyzing nucleic acids, mechanisms of RNA and protein synthesis, control mechanisms of DNA replication, repair and recombination, chromosome structure and function, regulation of gene expression, genome structure and genomics, and mechanisms of biological regulation. Prereq: Biology 240 General Genetics, Chemistry 350-360-369 Organic Chemistry and Lab.

403 Advanced Genetics Laboratory (3) Experiments illustrating methods in modern genetics: techniques in classical, cyto-, molecular and developmental genetics. Model organisms, Drosophila and mouse. Prereq: General Genetics and Organic Chemistry.

410 Cellular and Comparative Biochemistry (4)
Electrolyte behavior, chemistry and structure of proteins; enzyme behavior and biological function; carbohydrate and lipid chemistry, and membrane properties. Prereq: General Chemistry and Organic Chemistry. Prereq or coreq: 401 or 410.

421 Cell and Tissue Structure and Function (4)
Study of animal cells and tissues at light and electron micro scope levels. Prereq: Biology 140 Organization and Function of the Cell, and Biology 240 General Genetics. 3 hrs and 1 discussion.

419 Cellular and Comparative Biochemistry Lab (2) Experiments with enzymes, nucleic acids, and membranes and organelles. Chromatography, kinetics, hybridization, sequencing, and immunochemical methods. Prereq or coreq: 401 or 410.

429 Cell Biology Laboratory (3) Series of open-ended, discovery-based exercises developed to design and test new drugs using modern cell biology and computer technologies. Experimental modules: techniques used in cell isolation, purification, culturing, and testing, cell cycle analysis, apoptosis, computer modeling, and state-of-the-art electron microscopy. Experiment design, execution, data analysis, and peer evaluation. Prereq or coreq: 401 or 410.


471-81 Biophysical Chemistry (3,3) Physicochemical principles with applications to biological systems. 471—Thermodynamics; chemical equilibrium; solution chemistry; transport; electrochemistry; kinetics; enzyme catalyzed reactions. 481—Elementary quantum chemistry; interactions of light with biological molecules; optical and magnetic spectroscopy; light scattering; case studies of selected macromolecules. Prereq: Calculus, Organic Chemistry, General Biology or consent of instructor. (Same as Chemistry 471-81.)

480 Physiology of Exercise (3) (Same as Exercise Science 480.)

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

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for half-time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
511 Advanced Protein Chemistry and Cellular Biology (3) Structural and function at molecular and supramolecular level in progression; protein structure and function; metabolic structure and function; biochemical and membrane proteins. Prereq: Prior knowledge of cell biology and biochemistry and/or consent of instructor.

512 Advanced Molecular Biology (3) Regulation of nucleic acid expression and protein activity. Nucleic acid structure and function; replication and repair of nucleic acids; gene expression; protein synthesis; post-translational protein modification; mitosis and meiosis; cellular and cell growth. Prereq: 511 or consent of instructor.

513 Advanced Protein Biochemistry and Cell Biology II (3) Advanced topics of cellular function and regulation of cell division and growth; and structure and function of supramolecular structures; cytoskeleton and cell junctions and adhesions. Prereq: 511.

515 Experimental Techniques 1 (4) Modern experimental methodology and instrumentation lab. cell growth; spectrophotometry; microscopy; nucleic acid purification and analysis; protein assays; enzyme purification; electrophoresis; computer analysis of nucleic acid and protein sequences. Lecture on theory of laboratory to accompany two lab periods per week. Primarily for departmental graduate students. Prereq: Consent of instructor.

516 Experimental Techniques 11 (3) Laboratory rotations. Students work in laboratory of faculty member on clearly defined project. Written proposal and oral report. Primarily for departmental graduate students. Prereq: 515. S/NC only.

517 Physical Biochemistry (3) Physics and chemistry of biological systems and molecules. Thermodynamics; diffusion and transport; physical chemistry of macromolecules; enzyme kinetics; binding reactions; spectroscopy; electrophoresis. Prereq: 511 or consent of instructor.

520 Special Topics (1-3) Selected directed readings or special course in topics of current interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 6 hrs. S/NC only.

525 Graduate Research Participation (3-12) Tutorial laboratory experience. May be repeated. Maximum 12 hrs. S/NC only.

530 Experimental Design and Analysis (2) Development of skills in strategies of experimental design and interpretation of experimental results. Critical discussion of research articles illustrating issues in experimental design. Preparation of grant proposal in standard format to be read and discussed by class and by panel of faculty expert in area of proposal. Prereq: Consent of instructor.

550 Advanced Concepts in Neurobiology/Physiology (3) Concepts related to neurobiology/physiology with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor.

551 Advanced Concepts in Neurobiology/Physiology (3) Concepts related to neurobiology/physiology with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor.

553 Advanced Concepts in Neurobiology/Physiology (3) Concepts related to neurobiology/physiology with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor.

560 Advanced Concepts in Structural Biology/Biochemistry (3) Concepts related to structural biology: biochemistry with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor. May be repeated.

561 Environmental Toxicology (3) (Same as Ecol. and Evol. Biology 561.)

562 Introduction to Electron Microscopy - Transmission Electron Microscopy (3) Practical introduction to techniques for preparation of biological samples for viewing in transmission electron microscopy. Use of microscope and ancillary equipment, darkroom techniques, preparation of materials for publication and special project. Admission limited only to departmentally approved graduate students. (Same as Botany 510.) 2 3-hr labs.

564 Introduction to Electron Microscopy-Scanning Electron Microscope (3) Practical introduction to techniques of electron microscopy and to scanning electron microscope. Use of microscope, introduction to darkroom techniques and digital image processing, preparation of samples for observation, and special project. Prereq: Consent of instructor. 2 hrs and 1 lab.

570 Advanced Concepts in Cellular/Molecular Biology (3) Concepts related to cellular/molecular biology with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor. May be repeated.

580 Advanced Concepts in Genetics/Developmental Biology (3) Concepts related to genetics/developmental biology with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor. May be repeated.

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) S/NP only.

601 Departmental Seminar (1) Invited speakers. Topics posted in advance. Required every semester in residence. S/NC only.

603 Graduate Research Colloquium (1) Seminars and lectures dealing with current advances in fields of biochemical and biophysical methods. mechanisms of enzyme catalysis, gene expression, membrane structure and function, metabolic regulation, physiological, biochemistry, molecular genetics, cell biology, neurobiology, and related topics. Required every semester in residence. S/NC only.

605 Journal Club in Neurophysiology/Physiology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs. S/NC only.

606 Journal Club in Structural Biology/Biochemistry (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs. S/NC only.

607 Journal Club in Cellular/Molecular Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs. S/NC only.


610 Current Topics in Biochemistry, Cellular, and Molecular Biology (1-3) Critical reviews of research problems and methods in biochemistry, cell biology and/or molecular biology. Oral presentations, written reports, computer simulations by faculty and students. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

612 Advanced Topics in Environmental Toxicology (1-3) (Same as Ecology and Evolutionary Biology 612.)

615 Special Topics in Biochemistry, Cellular, and Molecular Biology (3) Biochemical and biophysical methods, mechanisms of enzyme catalysis, gene expression, membrane structure and function, metabolic regulation, physiological, biochemistry, molecular genetics, cell ultrastructure and physiology, neurobiology, and related topics. Prereq: 511-12 or consent of instructor. May be repeated. Maximum 9 hrs.

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Biosystems Engineering and Environmental Science

(College of Agricultural Sciences and Natural Resources)

MAJORS

DEGREES

Biosystems Engineering ............. M.S., Ph.D.
Biosystems Engineering Technology .... M.S.
Environmental and Soil Sciences .......... M.S.
Plants, Soils, and Insects .......... Ph.D.

Ronald E. Yoder, Head

Professors:
Ammons, J. T., Ph.D. ................. West Virginia
Ayers, P. D., PE, Ph.D. .............. NC State
Buschermohle, M. J., Ph.D. ............ Clemson
Denton, H. P., Ph.D. ............... NC State
Easington, M. E., Ph.D. .......... California (Riverside)
Freeland, R. S., PE, Ph.D. .......... Tennessee
Mote, C. R., Ph.D. ............... Ohio State
Tompkins, F. D., PE, Ph.D. .......... Tennessee
Tyler, D. D., Ph.D. ............... Kentucky
Wilhelm, L. R., PE, Ph.D. .......... Tennessee
Wills, J. M., S. ............... Louisiana State
Yoder, D. C., Ph.D. ............... Purdue
Yoder, R. E., PE, Ph.D. .............. Colorado State

Associate Professors:
Burns, R. T., PE, Ph.D. ............ Tennessee
Grandle, G. F., Ph.D. ............. Tennessee
Hart, W. E., Ph.D. ............... Purdue
Logan, J., Ph.D. ............... Nebraska
Pordesimo, L. O., Ph.D. ........ Pennsylvania
Raman, D. R. (Liason), PE, Ph.D. .... Ohio State
Savoy, H. J., Ph.D. ............. Louisiana State
Wilkinson, J. B., Ph.D. .............. Purdue
Womac, A. R., PE, Ph.D. .......... Tennessee

Assistant Professor:
Buchanan, J. R., PE, Ph.D. ........ Tennessee
Eash, N. S., Ph.D. ............... Iowa State
Lee, J., Ph.D. ............... Iowa State
Tytner, J. S., Ph.D. ............... Oklahoma State
Walker, F., Ph., Ph.D. ............. NC State
required depending upon the applicant’s academic background and interest area within the program.

A graduate program leading to a Master of Science with a major in Environmental and Soil Sciences is offered to graduates of recognized curricula in physical or biological sciences. The Graduate student also participates in the Plant, Soils and Insects Doctor of Philosophy program which is administered jointly by the departments of Biosystems Engineering and Environmental Science, Plant Sciences and Landscape Systems, and Entomology and Plant Pathology. For concentrations offered by these other departments, please see their sections in this catalog. Faculty in the Biosystems Engineering and Environmental Science Department administer the Environmental and Soil Sciences Master’s program and the Environmental and Soil Sciences concentration in the Plant, Soils, and Insects Doctor of Philosophy program. The Master’s and Doctoral programs are broad-based, emphasizing the application of chemical, biological, and physical principles to understand, manage, and manipulate the terrestrial environment. Within the concentration students may select an agricultural or non-agricultural focus area in soil and water chemistry; nutrient and elemental cycling; land management and reclamation; pedology; climatology; soil biology and biochemistry; contaminant transport; and soil physical processes.

A completed departmental data sheet and three completed Graduate Rating Forms are required in addition to the Application for Graduate Admission. Students must submit scores from the GRE general examination. Each applicant will be advised about any prerequisite courses before entering a program. The student’s program of study must be approved by his/her advisory committee and must comply with the requirements of the Graduate Council.

A significant aspect of graduate education beyond formal courses and thesis projects is active participation in the professional community which exists within academic departments at universities. Student/faculty seminars are one of the professionally rewarding activities of the community. Accordingly, all graduate students are encouraged to participate in Biosystems Engineering 505 and other departmental seminars regardless of whether they are registered for seminar credit.

THE MASTER’S PROGRAMS

Biosystems Engineering

Applicants accepted into the program must complete at least 30 semester hours to earn a degree. Of these 30 hours, 20 must be in courses numbered 500 or greater. Other specific requirements for the 30 hours are:

- Biosystems Engineering 507 (1), 505 (1), and other major subject courses 12
- Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6
- Program electives 6
- Thesis 500 6

In addition to completing the 30 semester hours, master’s students must pass a final oral examination covering the thesis, related areas, and graduate coursework.

Biosystems Engineering Technology

Thesis Option: Applicants accepted into the program must complete at least 30 semester hours to earn a degree. Of these 30 hours, 20 must be in courses numbered 500 or greater (6 hours of thesis plus 14 hours of other courses). Other specific requirements for the 30 hours are:

- Biosystems Engineering Technology 507 (1), 505 (1), and other major subject courses 12
- Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6
- Program electives 6
- Thesis 500 6

In addition to completing the 30 semester hours, master’s students must pass a final oral examination covering the thesis, related areas, and graduate coursework.

Non-Thesis Option: A non-thesis option in Biosystems Engineering Technology is available to qualified students. Applicants accepted into the program must complete at least 33 semester hours to earn a degree. Of these 33 hours, 20 must be in courses numbered greater than 500. Other specific requirements for the 33 hours are:

- Biosystems Engineering Technology 507 (1), 505 (1), and other major subject courses 12
- Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6
- Program electives 6
- Coursework in special emphasis area 6
- Capstone Experience (project and report, typically 508) 3

In addition to completing the 33 semester hours, non-thesis students must pass a comprehensive written final examination covering the graduate program, including the capstone experience. At the discretion of the candidate’s committee, an oral examination may also be required.

Environmental and Soil Sciences

Students seeking a Master of Science degree in Environmental and Soil Sciences will generally concentrate their studies in one of the ESS focus areas. The focus areas include: soil and water chemistry; nutrient and elemental cycling; land management and reclamation; pedology, genesis, and classification; environmental climatology; soil biology and biochemistry; and soil physical processes. Both thesis and non-thesis options are available. Please see the ESS Master’s concentration homepage for additional information: http://bioengr.ag.uky.edu/graduate/, or contact the ESS program’s graduate liaison.

Applicants having Bachelor’s degrees in fields that are related or unrelated to environmental and soil sciences may apply, although acceptance may be contingent upon the completion of prerequisite course work. Submit application, official transcripts, scores from the general portion of the Graduate Record Examination, and fee to the Graduate Admissions Office. In your application, indicate that you are applying to the Environmental and Soil Sciences Master of Science program. Submit curriculum vitae, three letters of reference (or three Graduate Rating Forms), and a short statement of professional goals and reasons for applying to: ESS Master’s Program Coordinator, Biosystems Engineering and Environmental Science Department, University of Tennessee, 2506 E.J. Chapman Dr., Knoxville, Tennessee 37996-4531.

Thesis Option:

1. Upon consultation with the department head, the student will be assigned a major professor who acts as chair of the student’s advisory committee. The student and the major professor will assemble a graduate advisory committee consisting of the major professor and a minimum of two additional faculty, each holding the rank of assistant professor or above. At least one-half of the committee members must hold teaching appointments. The advisory committee must be formalized by the end of the second semester of graduate study.

2. Develop and submit an approved program of study by the end of the second semester of graduate study. A minimum of 24 hours of graduate course work is required in the program of study, exclusive of six hours of 500 Thesis. The program of study is subject to the approval of the student’s advisory committee, and must meet the following requirements:

- 500 Thesis 6
- 503 Seminar 2
- Courses numbered above 503 12
- Courses within the major (excluding courses numbered 503 and below) 10
- Other courses that are in the major include those in Environmental and Soil Sciences. In addition, Geology 510 and Environmental Engineering 535 are in the major. The student’s committee may require additional course work beyond the 24 hours if the student’s progress or background indicates a need or deficiency.

3. Develop a research problem and presentation by means of a written proposal to the student’s committee. This must be completed during the first two semesters of graduate study and before enrollment in 500.

4. Pass a final examination that integrates the student’s thesis and coursework, administered by the advisory committee. The student is expected to be conversant in the soil and environmental sciences, particularly in the thesis and allied areas.

5. Present at least two departmental seminars (two hours of 503), in addition to an exit seminar (no credit).
A student who has started a degree program under the thesis option is not eligible to transfer to the non-thesis option after the end of the first semester of graduate study or after receiving a graduate assistantship stipend for more than one semester.

Non-Thesis Option: A student desiring the non-thesis option must declare his/her intention before the beginning of the second semester of study. The student must meet the following requirements, in addition to those of the University Graduate Council (as specified in the Master’s Degrees section at the front of this catalog).

1. Upon consultation with the department head, the student will be assigned a major professor who acts as chair of the student’s advisory committee. The student and the major professor will assemble a graduate advisory committee consisting of the major professor and a minimum of two additional faculty, each holding the rank of assistant professor or above. At least one-half of the committee members must hold teaching appointments. The advisory committee must be formalized by the end of the second semester of graduate study.

2. Develop and submit an approved program of study by the end of the second semester of graduate study. A minimum of 33 hours of graduate coursework is required in the program of study. The program of study is subject to the approval of the student’s advisory committee, and must meet the following requirements:

   - 503 Seminar 2
   - 593 Special Problems in Environmental and Soil Sciences 3
   - Courses numbered above 503 (exclusive of 593) 18
   - Courses within the major (excluding 500 and 502) 12

Courses that are in the major include those in Environmental and Soil Sciences. In addition, Geology 510 and Environmental Engineering 535 are in the major. The student’s committee may require additional coursework beyond the 33 hours if the student’s progress or background indicates a need or deficiency.

3. In lieu of a thesis, students are required to complete three hours of 593 by participating in a single research program for a period of 12 weeks. The advisory committee approves the research problem. Satisfactory completion of this requirement requires a written, original research report that is acceptable to the student’s committee.

4. Pass a comprehensive written examination that integrates the student’s course work and research problem. The examination is developed and administered by the advisory committee.

5. A student who has started a degree program under the non-thesis option may transfer to the thesis option upon approval of a potential major professor and the department head.

6. Satisfaction of the comprehensive examination as required by the Graduate Admissions Office. In your application, indicate that you are applying to the Plants, Soils and Insects doctoral program. Submit resume, three letters of reference (or three Graduate Rating Forms), photocopy of GRE scores and a short statement of professional goals and reasons for applying to ESS PhD Program Coordinator, Biosystems Engineering and Environmental Sciences Department, University of Tennessee, 2506 E.J. Chapman Drive, Knoxville, Tennessee 37996-4531. In your statement letter and application, please indicate your interest in the ESS concentration.

Degree Requirements

To obtain the doctorate, the student must meet the following requirements:

1. The student and the major professor will select a minor with three additional faculty, holding the rank of assistant professor or above, to serve on the student’s doctoral committee. The major professor and two committee members must be approved to direct doctoral research by the Graduate Council, and at least half of the committee must hold teaching appointments. At least one member of the committee must be from outside the department. The doctoral committee must be formalized by the end of the second semester of graduate study.

2. Submission of an approved program of study by the end of the second semester of graduate study. A candidate for the doctoral degree must complete a minimum of 24 hours of graduate coursework numbered 503 or higher beyond the master’s degree. Candidates not having a masters degree must complete a minimum of 48 hours of graduate coursework beyond the baccalaureate degree, 24 hours of which must be numbered 503 or higher. A minimum of 12 of the 24 hours, or 30 of the 48 hours, must be graded A-F. At least 9 hours of the student’s coursework must be from outside the PSI major, and a minimum of 6 semester hours must be taken in UT courses numbered 601 or higher. In addition, 24 hours of course 600 and other related areas). Of the 75 hours, 48 must be in courses numbered greater than 500 (including 24 hours of course 600) and 6 hours of courses at UT numbered greater than 600. Other specific requirements for the minimum 75 hours are:

   - Major subject courses 18
   - Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 9
   - Program electives 21
   - Seminar (507, 505 or equivalent courses) 3
   - 600 Dissertation 24

In addition to completing the minimum 75 hours of graduate credit required for a degree, each doctoral student must also pass a comprehensive examination as required by the Graduate Council.

Biosystems Engineering

GRADUATE COURSES

411 Mechanical Systems Engineering (3)
421 Natural Resource Engineering (3) Introduction to hydrologic cycle: movement of water and interaction with environment through such processes as erosion and contaminant transport. Impacts through estimation and measurement, and controlling impacts through engineering design. Specific designs: waterways, erosion and sediment control structures, waste management, and construction systems and hydrologic monitoring systems. Prereq: 321 Biothermodynamics, Heat, and Mass Transfer; Environmental Engineering 210 Introduction to Soil Science; Civil Engineering 390 Hydraulics; or Aerospace Engineering 341 Fluid Mechanics. 2 hrs and 1 lab.

431 Bioprocessing Engineering (3) Application of basic engineering principles to processing and handling of biological materials: physical, chemical, biological properties; materials handling; material conversion; dewatering; heat processing; and bioprocessing. Coreq: 321 Biothermodynamics, Heat and Mass Transfer or equivalent. 2 hrs and 1 lab.

441 Life Systems Engineering (3) Design of controlled environments to optimize conditions for organisms growth and development: growth equations and population dynamics; plant growth systems; microbial growth systems; animal growth systems; biotechnological and biological systems; environmental and production systems; thermodynamics of composting; biology of growth and development: growth equations and development. Prereq: 421 Natural Resource Engineering or equivalent. 2 hrs and 1 lab.

451 Electronic Systems (4) Basic electronics with biological applications. Analog and digital electronics: sensing and electronic control; biological and environmental systems sampling; sensor selection and interfacing; signal conditioning; process control. Laboratory experiments and design projects. Prereq: Circuits and Electro Mechanical Components. 3 hrs and 1 lab.

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

502 Registration for Use of Facilities (1-15) 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.

505 Professional Communications Seminar (1) Reviews, reports and discussion of ideas, recent advances and current topics: presentations by students. Should be taken in last full semester before graduation. Prereq: 504. May be repeated in doctoral program. Maximum 2 hrs. (Same as Biosystems Engineering Technology 505.) S/NC only.

507 Professional Development Seminar (1) (Same as Agriculture and Natural Resources 507, Animal Science 507, Biosystems Engineering Technology 507, Environmental and Soil Sciences 507, Food Science and Technology 507, Plant Sciences and Landscape Systems 507.) S/NC only.

510 Similitude in Design and Research (3) Dimensional analysis; governing equations; theory of models; true, distorted, dissimilar models; prediction equations; interpretation of data; applications to machinery, soil and water structures, agricultural buildings and other agricultural engineering related problems. Prereq: Engineering Science 321, 341.2 hr and 1 lab.

525 Soil Erosion and Sediment Yield (3) (Same as Environmental Engineering 525.)

530 Research Problems in Biosystems Engineering (1-9) Problem-oriented study relating to current problems in agricultural engineering. May be repeated. Maximum 6 hrs.

541 Principles of Compost Engineering (3) Comprehensive study of composting: survey of installed systems; thermodynamics of composting; biology of composting; kinetics of heat inactivation; feed conditioning; aeration; substrate characteristics; process kinetics; design component. Prereq: Thermodynamics, heat and mass transfer.

543 Instrumentation and Measurement (3) Modern instrumentation techniques. Static and dynamic response of instrumentation; signal conditioning; temperature, moisture, energy, radiation, and temperature-sensitive systems; strain, pressure, velocity, acceleration, and flow measurements; digital data acquisition and control. Prereq: 451 or Instrumentation and Computer Circuits or equivalent. 2 hrs and 1 lab. (Same as Environmental Engineering 543.)

545 Monitoring Hydrologic Phenomena (3) Application of instrumentation theory to monitoring hydrologic phenomena; stresses and weaknesses of current equipment and solution of environmental monitoring problems. Prereq: 543 and knowledge of basic hydrology. 2 hrs and 1 lab. (Same as Environmental Engineering 545.)

550 Selected Topics (1-3) Lecture/group discussion on specialized topics. May be repeated. Maximum 6 hrs.

552 Biological Treatment Theory (3) (Same as Environmental Engineering 552.)

555 GIS and GPS Applications to Biosystems (3) Theory and applications of Geographical Information Systems (GIS) and Global Positioning Systems (GPS); acquiring, managing, and analyzing spatially-variation data. Site-specific agriculture, environmental site assessment, natural resource management, and hydrology. Prereq: Graduate standing in engineering, biological or physical sciences. (Same as Biosystems Engineering Technology 555.) 2 hrs and 1 lab.

575 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 575, Environmental Engineering 575, and Microbiology 575.)

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

620 Computer Simulation of Agricultural Systems (3) Scientific approach to digital simulation; system definitions and boundaries, formulation of models, design of simulation techniques, encoding of prediction equations models, algorithms and solution techniques; encoding of prediction equations and model output; verification and calibration of simulation model results. Prereq: Knowledge of computer programming language. 2 hrs and 1 lab.

636 Geospatial Methods for Environmental Research 632 (3) Sampling and displaying the multidimensionality of environmental variables, Spatial and temporal sensing of the environment. Geostatistical mapping and interpretation; sampling theory; precision geomatic techniques for the environmental scientist and engineer. Prereq: 555 or equivalent. 2 hrs and 1 lab.

650 Selected Topics (1-3) Lecture, group discussion, and individual study on specialized developments. May be repeated. Maximum 6 hrs.

514 CAD Applications to Biosystems Engineering (3) Computer-Aided Drafting (CAD) applications in agriculture and environmental science. Essentials of CAD software to create drawings of components, systems, flow charts, and process diagrams. Applications in mechanical, structural, and biosystems. 2D applications with limited exposure to 3D applications. Computer intensive course. Hands-on experience. Prereq: Computer proficiency and admission to graduate program. (Students cannot receive credit for both 414 CAD Applications to Biosystems Engineering and 514.) Two 2-hr labs.

522 Processing and Environmental Systems (3) Environmental systems in plant and animal production: application of electronic and mechanical equipment, structures, crop processing and materials handling. Prereq: 506. 2 hrs and 1 lab.

532 On-Site Domestic Water Supply and Wastewater Renovation (3) Basic ground water hydrology, selection of pumps and delivery systems with point-of-use treatment processes; soil-based wastewater renovation principles, and design and operating criteria for on-site wastewater renovation systems. Prereq: 506. 2 hrs and 1 lab.

542 Simulation of Agricultural Systems (3) Synthesis and analysis of agricultural systems using computer simulation, philosophy of system simulation, statistical analysis of experimental and continuous systems. Prereq: 506 and scientific computer programming. 2 hrs and 1 lab.

546 Automation Devices and Applications (3) Basic electronics as applied to simple automation systems, programmable controllers, data acquisition, digital logic and transducers. Prereq: 506 or consent of instructor. 2 hrs and 1 lab.

555 GIS and GPS Applications to Biosystems (3) (Same as Biosystems Engineering 555.)
574 Environmental Instrumentation and Monitoring (3) Equipment and techniques commonly used to measure all aspects of hydrologic cycle: precipitation, runoff, streamflow, subsurface water movement. Sampling of all flows for contaminants. Design of monitoring systems. Analysis of data. Prerequisite: Environmental and Soil Sciences 324 and Soil and Water Conservation. Statistics 201 Introduction to Statistics. Mathematics 152 Mathematics for the Life Sciences II, or consent of instructor. (Students cannot receive credit for both 474 Environmental Instrumentation and Monitoring and 574.) 2 hrs and 1 lab.

Environmental and Soil Sciences

GRADUATE COURSES

434 Environmental Soil Chemistry (3) Composition and chemical properties of soils and processes that govern rate and behavior of chemicals in soil environment: clay mineralogy; soil organic matter; mineral weathering and stability; aqueous speciation; surface chemistry; ion exchange, adsorption and molecular retention; oxidation-reduction; and soil acidity, alkalinity, and salinity. Prerequisite: Soil science and organic chemistry or equivalent.

442 Soil Genesis and Classification (3) Soil genesis and formation; observing and describing morphology of agricultural soils; physical and chemical properties, classification. 3 weekend field trips. Prerequisite: Soil science. 2 hrs and 1 lab.

444 Transport Processes in Soil (3) Basic understanding of soil physical properties and processes; influence of soil physical properties on water and chemical movement in soil; practical experience in the measurement and analysis of soil physical properties, water flow, and chemical movement in soil. Prerequisite: 210 Introduction to Soil Science and Physics 221 or equivalent.

462 Environmental Climatology (3) Study of atmosphere as environment. Physical, chemical and biological factors affecting climates of various earth environments; meteorological process affecting biosystems. Climatic change and the human impact on the atmosphere, consequences of climatic change and mitigation policies, microclimates and urban climates, atmospheric pollution, extreme events and ozone depletion. Design and operation of weather information systems and automated weather stations. Prerequisite: Agricultural and Natural Resources 290 Computer Applications to Problem Solving or equivalent.

481 Capstone in Environmental and Soil Sciences (3) Integrative course in which students work individually and collaboratively to develop solutions for soil and water related environmental problems. Writing and oral communication emphasis course. Prerequisite: 434 and senior standing.

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

501 Seminar Preparation (1) (Same as Plant Sciences and Landscape Systems 505.)

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 Seminar (1) Presentations and discussion of current scientific material. May be repeated. Maximum 3 hrs.

507 Professional Development Seminar (1) (Same as Agriculture and Natural Resources 507, Animal Science 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Food Science and Technology 507 and Plant Sciences and Landscape Systems 507.) S/N only.

511 Soil-Plant Relationships (3) Principles of mineral nutrition of higher plants: plant physiological characteristics that influence uptake of water and nutrients; functions of nutrient elements in plants; soil factors influencing nutrient availability to plants; important relationships at soil-plant root interface; and responses to adverse soil environmental conditions. Prerequisite: 434 or Integrated Plant Systems 431 or Plant Sciences and Landscape Systems 431 or general plant physiology. 3 hrs and 1 rec.

512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming processes, Prerequisite: 442 or consent of instructor. 2 hrs and 1 lab.

513 Advanced Soil Chemistry (3) Chemical properties and processes that operate in soil environment: thermodynamics of soil solutions and surface chemistry of soils, soluble complex formation, mineral solubility, electrochemical equilibria, geochemical modeling, ion exchange equilibria, surface functionality and reactivity, adsorption, phenomena, and surface complex modeling. Prerequisite: 434 or consent of instructor.

514 Environmental Soil Physics (3) Principles of water, gas, heat, and solute movement in soil/water systems; application of appropriate models for the description of these processes; methods for characterizing hydraulic and chemical transport properties of soils; interactions of soil physics to solution of contemporary problems in water conservation, prevention of surface/ground water contamination, and management of plant water status. Prerequisite: 444 or equivalent.

516 Soil Biology and Biochemistry (3) Soil organisms and their activities in soils: soil ecology, biogeochemical cycling of important elements, organic matter dynamics, and applications of agricultural and environmental biology and biochemistry. Prerequisite: 210 Introduction to Soil Science or consent of instructor. 2 hrs and 1 3-hr lab.

561 Special Problems in Plant and Soil Science (1-3) May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15)

601 Special Topics in Soil Science (1-3) Thermodynamics of soil solutions, clay structure and surface chemistry, soil mineralogy, plant mineral nutrition, soil microbiology, water movement and use by plants, soil structure, soil thermal properties, interaction in the soil-plant environment. May be repeated. Maximum 6 hrs.

613 Advanced Topics in Soil Chemistry and Fertility (2) Topics of current significance; scientific literature. Prerequisite: 513 or equivalent.

614 Advanced Topics in Soil Biology and Biochemistry (2) Topics of current significance; scientific literature. Prerequisite: 516 or equivalent.

615 Advanced Topics in Soil Physics, Genesis, and Morphology (2) Topics of current significance; scientific literature.

Botany

(College of Arts and Sciences)

MAJOR DEGREES

MAJOR .................. M.S., Ph.D.

Edward E. Schilling, Head

Professors:

Caponetti, J. D., Ph.D. ............... Harvard University
Hickok, L. G., Ph.D. .............. Massachusetts Institute of Technology
Hughes, K. W., Ph.D. ................. University of Washington
Mullin, B. C., Ph.D. .......... North Carolina State University
Petersen, R. H. (Distinguished Professor), Ph.D. ............. University of California, Berkeley
Ph.D. ......................... Columbia University
Schilling, E. E. (Liaison), Ph.D. ............ Indiana University
Schwarz, O. J., Ph.D. ..... North Carolina State University

Associate Professors:

Amundsen, C. G., Ph.D. ................. Colorado State University
Pigliucci, M., Ph.D. .................. University of Connecticut
Smith, D. K., Ph.D. ............... University of Tennessee
Wofsd, B. E. (Curator), Ph.D. ........ University of Washington von Anim, A. G., Ph.D. ......... East Anglia (UK)

Assistant Professors:

Cruzan, M. B. C., Ph.D. .... SUNY (Stony Brook)
Nebenfueher, A., Ph.D. ............... Oregon State University
Small, R. L., Ph.D. ................ Iowa State University

Lecturer:

McFarland, K. D., Ph.D. ............. Tennessee State University

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, botany, cytology, cytogenetics, ecology, genetics, lichenology, molecular biology, morphology, mycology, photobiology, physiology, pteridology, and systematics.

The normal service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

For further information, contact the Department Head or the Graduate Coordinator.

ADMISSION REQUIREMENTS

The Botany Department requires scores from the general portion of the Graduate Record Examination, at least three letters of recommendation or standard recommendation forms from academic or professional persons, a short statement describing reasons for interest in graduate education in botany, and the following academic requirements:

1. Bachelor’s degree: a B.A. or B.S. from an accredited college or university and a cumulative grade-point average of 2.5 or better (on a 4.0 scale), with evidence of ability to do work of graduate quality.

2. General botany or general biology: 8 semester hours.

3. Advanced botany or closely allied biological sciences: 12 semester hours.

4. Physical sciences: general inorganic chemistry: 8 semester hours; organic chemistry: 8 semester hours. Physics highly recommended.

5. College mathematics: 6 semester hours including 1 term of calculus.

Evidence of a broad undergraduate background, an ability to do work of graduate quality, and an interest in the study of plant science are considered to be much more important than the particular courses taken as an undergraduate. Accordingly, students lacking specific prerequisite courses but otherwise qualified may be admitted to graduate study in botany. In such cases, the deficiencies should be removed as soon as possible, typically during the first year of the student’s graduate program. The determination of deficiencies and the manner in which they will be removed will be decided upon by the student’s pro-tem committee during the first meeting with the student.
THE MASTER'S PROGRAM

The program for the Master of Science is patterned to fit the needs of students who desire a less extensive course of study than the Ph.D. program. However, the applicant must be equally well prepared and display an aptitude and ability for advanced study. The M.S. includes thesis and non-thesis options.

Thesis Option

The thesis program is the usual route taken by botany students for the M.S. It is important that the entering student promptly identify a major professor and a suitable research project. The requirements for the thesis option consist of the following:

1. Satisfactory preparation of a written formulation and an oral defense to the student's committee of a research proposal suitable for a thesis. This must be completed before enrollment in Botany 500.
2. Successful completion of 30 hours of graduate credit, at least two-thirds of which must be at the 600 level or higher.
3. Satisfactory completion of two hours at the 600 level.
5. Presentation of a 30-minute departmental seminar.
6. Educational service in the form of teaching and/or ancillary services; consult major professor and department head.

Non-Thesis Option

1. Satisfactory completion of 34 semester hours of approved graduate courses of which 30 semester hours must be in botany including Botany 503. At least two-thirds of the hours must be at the 500 level or higher.
2. Satisfactory completion of two hours at the 600 level.
3. Educational service in the form of teaching and/or ancillary services; consult major professor and department head.
4. Satisfactory performance on a final written examination on all work offered for the degree. The student's committee may also require that an oral examination follow the written examination.

THE DOCTORAL PROGRAM

The Doctor of Philosophy program is patterned to provide training that involves extensive independent research within the student's area of concentration. Although there is no formal program of coursework, the student's committee may require specific courses for the completion of the degree. Most students spend from three to five years working on their Ph.D.

Requirements for successful completion of the Ph.D. are as follows:

1. Satisfactory presentation of a research problem by means of a written proposal and an oral defense to the student's committee. This must be completed before enrollment in Botany 600.
2. Satisfactory performance on a written comprehensive examination.
3. Presentation of one or more cognate areas outside of the department totaling 6 hours of graduate credit with at least a B average.
4. Satisfactory completion of 6 hours at the 600 level (excluding dissertation).
6. Presentation of a departmental seminar near the end of the doctoral program.

Note: The listed requirements for the M.S. and Ph.D. degrees should be interpreted as minimal requirements. Other stipulations or specific requirements such as additional foreign languages or an additional oral comprehensive examination may be required by the student's faculty committee.

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

400 Plant Molecular Biology (4) Current research in plant molecular biology: techniques and procedures. Genome structure, gene expression and regulation, transformation, transposable elements, plant development. Labs: isolation of DNA and RNA, molecular hybridization, isolation and preparation of plasmids, PCR amplification of specific sequences, DNA sequencing and transformation. Prereq: Biodiversity, Organization and Function of the Cell and Genetics with grade of B or better and consent of instructor. 2 hrs and 4 labs.
412 Plant Anatomy (3) Cells, tissues and organs: development in vegetative and reproductive structures of vascular plants—seed plants. Prereq: General Botany or Biodiversity; Organization and Function of the Cell or equivalent.
419 Science as Method (3) (Same as Ecology and Evolutionary Biology 419 and Philosophy 419.)
431 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Circulation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq: Field Botany or equivalent. (Same as Ecology and Evolutionary Biology 431.)
451 Plant Tissue Culture (3) Methods for culture of tissues, cells, and organs: media preparation and maintenance of cultures. Prereq: General Botany or Biodiversity; Organization and Function of the Cell or equivalent and General Chemistry or equivalent. Recommended prereq: Botany 412; Plants: Evolutionary Survey; Introduction to Plant Physiology; Introduction to Microbiology and Lab; Plant Propagation; and Field and Forage Crops.
500 Thesis (1-15) P/NP only.
502 Registration for Use of Facilities (1-15) 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 Non-Thesis Research (2) Library, field, or laboratory research under supervision of staff member. Not for thesis candidates. May be repeated. Maximum 4 hrs.
506 Physiole (4) Comparative study of major algal phyla, both freshwater and marine: morphological, developmental, ecological, taxonomic and phylogenetic aspects. Field and laboratory studies, identification, classification, experimentation. Prereq: 310 or consent of instructor. 3 hrs and 1 lab.
507 Biological Illustration (3) Principles and applications of photography (B/W and Color) photo-macro- and photomicrography, drawing, graphics and video for recording and presentation for research and publication of data in pictorial and graphic form.
510 Introduction to Electron Microscopy - Transmission Electron Microscopy (4) (Same as Biochemistry and Cellular and Molecular Biology 562.)
530 Advanced Taxonomy of Flowering Plants (3) Evolution and classification of families of angiosperms, local flora. Prereq: 330 or equivalent. 2 hrs and 1 lab.
531-32 Special Problems in Botany (1-4,1-4) May be repeated. Maximum 12 hrs.
544 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 8 hrs. S/NC only.
585 Methods and Instrumentation in Field Investigation (1) Appropriate methods and instrumentation. Topics vary. May be repeated with consent of instructor. Maximum 5 hrs. S/NC only.
599 Advanced Evolutionary Ecology (3) Advanced concepts in evolutionary and ecological genetics. Biogeo-graphy, climate, population genetics, evolution and natural selection, population growth and regulation, competition, niche, experimental ecology, predation, phylogenetics in ecology, biodiversity and conservation. Prereq: General Biology and General Ecology; one or more courses on organismal biology (ecology, evolution) at the upper undergraduate level or consent of instructor. Students cannot receive credit for both 499 and 599. (Same as Ecology and Evolutionary Biology 599.)
600 Doctoral Research and Dissertation (3-15) P/NP only.
606-07 Advanced Topics in Botanical Sciences (1-3,1-3) Experimental botanical science: nomenclature, morphology and systematics of vascular plants, crypto-gamic botany, cytology and cell biology, genetics, plant physiology, pathology and ecology. May be repeated. Maximum 12 hrs.
662 Seminar in the History of Botany (2) History of botanical exploration and advances from early civilized to modern periods. May be repeated. Maximum 4 hrs.

Business Administration

(College of Business Administration)

MAJOR DEGREES

Business Administration ......................... MBA, J.D.-MBA, M.S.-MBA, Ph.D.

The College of Business Administration offers two college-wide programs, the MBA and the Ph.D. with a major in Business Administration. Two tracks are available for the MBA: the regular, full-time program and the executive program.

The full-time MBA is for students seeking a full-time, weekday program that follows the traditional academic format. The nature of this program precludes students from simultaneously working full-time outside of
Admission Requirements
Applications are accepted for fall semester only. The application deadline for fall semester is March 1. Applications by U.S. citizens and permanent residents received after March 1 will be considered as space allows.

To be considered for admission, the applicant’s file must be complete. A completed file includes the Application for Graduate Admission, transcripts of prior college work, the MBA program application, two completed applicant recommendation forms, and the Graduate Management Admission Test (GMAT) score report. The first items should reach the Office of Graduate Admissions one month before the MBA application deadline to allow for processing. Additional information is required by Graduate Admissions for international students.

For admission to the MBA program, consideration is given to (1) an applicant’s academic record with particular attention to the last two years of undergraduate work and previous graduate studies, (2) scores on the GMAT and the Test of English as a Foreign Language (TOEFL) for those whose native language is not English, (3) work experience and other activities that demonstrate potential for leadership, and (4) recommendations from professors and work supervisors. The admission decision is based on all factors that make up the total application; therefore, there is no automatic cut-off for either grade point averages or GMAT scores. However, admission preference will be given to applicants with full-time work experience after obtaining the undergraduate degree.

Prerequisites
There are no specific course prerequisites for admission. However, undergraduate courses and work experience should demonstrate ability with both qualitative and quantitative work.

MBA Core
The MBA core (32 hours total) consists of: a 3-hour foundations course taken during the weeks prior to the beginning of fall semester, a 15-hour career development course and a 1-hour distance course taken in the first semester (Fall 1), a 9-hour core course taken in the second semester (Spring 1), a 3-hour distance course during the internship (Summer), and a 1-hour capstone in the third semester (Fall 2). The topics introduced within these courses fall under three major themes. The first theme covers “what every manager needs to know,” and includes such functional topics as finance, strategy, decision tools, environmental analysis, and leadership skills development. The second theme focuses on functions involved in the flows of product, information, and finance within an integrated value chain, to include, but not limited to, operations management, logistics management, demand management, customer relationship management, supplier management and resource management. The third theme involves integrating the content of the other two themes using information technology. Throughout all three themes, significant emphasis is placed on learning the topics in an integrated fashion. Students will understand how various business functions are integrated within an organization, as well as how integration should occur across organizations within the context of a value chain.

Students in the first-year core undertake active learning within a team-based environment. Many core requirements are experiential exercises in which self-discovery within a team setting is an important element of the learning process. Individualized support is provided for developing both written and oral communication skills.

Concentration and Electives
A concentration area may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection should be made after the first semester and must be made after completion of the first year. Requests for changes in concentration area must be submitted for approval to the MBA Program Office.

Among the 15 credit hours in the concentration/electives block, 9 credit hours must be taken in one of the following concentration areas for specific courses required in concentration areas, see the appropriate field of instruction.

Finance
Operations Management
Marketing
Logistics and Transportation

Operations Management
The first course in each concentration is designed to provide a foundation upon which the concentration can be built. These courses will be delivered in the latter part of the fall semester of the first year, after the Spring core course has been completed. They are intended to prepare students for their summer internships. However, these courses should not be thought of as simply the first three hours in a nine-hour elective. Rather, these courses are self-contained, intensive introductions to a specialty area of business. Students will choose two of these courses in the spring semester, which will permit them flexibility for choosing concentrations in the second year of the program. Two additional courses in the concentration area will be taken in the second fall semester to meet the 9-hour requirement for a concentration.

Concentration and Electives
Students will choose two of these courses in the spring semester, which will permit them flexibility for choosing concentrations in the second year of the program. Two additional courses in the concentration area will be taken in the second fall semester to meet the 9-hour requirement for a concentration.

Concentration Areas:
1. Finance
2. Operations Management
3. Marketing
4. Logistics and Transportation

Transfer Credits
Graduate level courses taken at other institutions accredited by the American Assembly of Collegiate Schools of Business that otherwise conform to University policy may be credited toward MBA degree requirements within the following limits:

- Concentration Area: 3 hours (provided at least 6 hours of work at this institution are included in the concentration area).
- Elective Area: 3 hours

Because of the fully integrated nature of the first-year curriculum, no credit hours are transferred into this core curriculum. The maximum number of hours that may be transferred to elective and concentration areas is 6 semester hours. Transfer credit will be considered upon formal petition to the
Other Requirements

The Application for Admission to Candidacy must be approved by three faculty members in the intended student group and the Associate Dean of the MBA Program. It should be submitted to the Graduate Student Services Office at least one full semester prior to the date the degree is conferred. (Application to candidacy for the MBA degree must be submitted in the spring semester for graduation in the following fall semester.)

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area, and a B average or higher in the overall program.

THE EXECUTIVE MBA PROGRAMS

Each of the four programs of the executive track is designed to serve the needs of a different student group. The programs share a common course structure of 36 credit hours of classroom learning (BA 551, 552, 555) and 9 credit hours of projects applied within the student’s business organization (BA 561,562 and 563). Students carry a full, 15-credit-hour load each semester. In each program, all participants begin and complete the program together.

The courses are functionally integrated, and the broad curriculum objectives are similar in each of the executive track programs. All are oriented toward applied learning and are highly interactive, making extensive use of experiential learning techniques. Emphasis and depth of subject material within the curriculum varies somewhat from program to program depending on the intended student group. All programs result in the same Master of Business Administration degree as the full-time MBA.

Admissions Criteria:

Primary consideration is given to the applicant’s professional achievement and recommendations from the applicant’s organization. Applicants must meet the minimum requirements of the Graduate Council and submit transcripts of all undergraduate and graduate work. Applicants may need to take the Graduate Management Admission Test (GMAT) (see specific program descriptions). No specific cut-off score exists for either grade-point averages or GMAT scores; however, admission is competitive, and applicants will be evaluated on their ability to operate on a par with other high achieving participants. Students whose native language is not English must take the Test of English as a Foreign Language (TOEFL) unless they are U.S. citizens or have earned a degree from an accredited college or university within the past two years. A minimum TOEFL score of 213 on the computer-based test is required for admission to graduate study.

Prerequisites: Although there are no specific course prerequisites for admission, undergraduate studies and professional experience should demonstrate ability with both qualitative and quantitative work.

Transfer Credits: Because of the integrated nature of the executive track curricula, no credit hours may be transferred as substitutes for program curriculum.

Other Requirements: Other requirements are the same as those for the full-time MBA program.

Professional MBA Program

The weekend professional MBA is provided for fully-employed managers within continuing distance of the University of Tennessee. The group of students for whom this program is designed has approximately five years of work experience. The emphasis in this program is to provide a good grounding in the quantitative and qualitative tools of various business functions and a good basis in strategic thinking. Learning is expanded through applying these tools within the student’s own organization through a structured project each semester. The professional MBA is the right choice for individuals who wish to enhance their position within their organization by broadening their business knowledge beyond the functional area in which they are currently employed.

The Professional program is three consecutive semesters completed in 16 months. Classes meet all day on Saturdays and via live, distance learning classes on Tuesday evenings. The program begins in August with an intensive week of classes, then continues with weekend classes. The final fall semester also includes an intensive week of courses in addition to weekend classes. Graduation is in December. Applications are accepted for fall semester only. The application priority deadline is April 10.

Additional information on the professional MBA can be found at www.promba.utk.edu.

Senior Executive MBA Program

The Senior Executive MBA is provided for a national audience of managers holding middle and upper level positions in organizations that support their attainment of an MBA degree. The students for whom this program is designed have at least 10 years of work experience and are currently in management positions. Typical students bring a greater knowledge of business fundamentals than is true of others. The Senior Executive MBA places considerable emphasis on global business and on individual skills of leadership. The program also has a heavy emphasis on strategic thinking and leadership management concepts. The Senior Executive MBA is the right choice for individuals who are in positions of broad responsibility or who have been designated to fulfill such roles within their organizations in the future.

The Senior Executive MBA is three consecutive seminars completed in 12 months. The class meets in Knoxville for 11-day resident periods in alternate months starting in January and ending in December. The May residence period is a global business seminar of two weeks and is held in South America, Asia or Europe. Off-campus work includes distance learning classes and requires substantial and regular contact with faculty and other participants. The project work in the Senior Executive MBA is a large-scale management project running throughout the year. Students work with managers in their own organizations to choose a project of significant scale and scope. Each project has a faculty advisor.

Applications are accepted for January entry only. The early application deadline is June 1, and the final application deadline is September 15. The GMAT may be waived depending on work experience. Students will receive materials for study in mid-November preceding the January start date.

Additional information on the executive MBA can be found at www.emba.utk.edu.

Physician Executive MBA

The Physician Executive MBA is provided for a national audience of physicians. The students for whom this program is designed have an M.D. or D.O. degree with five or more years of work experience. The curricular objectives are the same as those for the executive MBA, but in the Physician Executive MBA, many of the functional skills are taught in the context of the health care industry with specialized content related to the health care environment. The Physician Executive MBA is the right choice for physicians who want to have a voice in the health care industry, in their own careers, and are seeking a program that allows them to continue their practice while earning their MBA degree.

The Physician Executive MBA is three consecutive semesters completed in 12 months. The class meets in Knoxville for 9-day resident periods in January, April, August and December. Between resident periods, live distance learning classes are held each Saturday morning, and there are asynchronous internet learning sessions each week.

Applications are accepted for January entry only. Applications are accepted throughout the year. The final application deadline is November 1. Applicants to the physician executive MBA are not required to take the GMAT test.

Additional information on the Physician Executive MBA can be found at www.pemba.utk.edu.

The Aerospace Executive MBA

The Aerospace Executive MBA is provided for a national audience of managers from defense and commercial aerospace organizations. The students for whom this program is designed have five to ten years of work experience and are currently employed in the aerospace sector. The emphasis in this program is providing a solid grounding in the broad range of business functions comprising virtually all MBA programs. However, much of this coverage will be delivered within the context of the aerospace industry. Beyond a basic grounding in business fundamentals, this program will offer advanced concepts especially relevant to managing the complex value streams that produce today’s most advanced aircraft. Advanced coverage and emphasis will be given to value stream integration, lean manufacturing, and industrial statistics in particular. This mix of topical coverage is ideal for engineers and others with technical backgrounds who are transitioning into program management where business and leadership skills are critical.

The program starts each fall semester and is completed in three consecutive semesters spread over twelve months. Classes are held during six residency periods, lasting from eight to eleven days each, some of which may be hosted on-site at the facilities of...
organizations participating in the program to facilitate hands-on learning. Between residency periods, formal coursework continues with bi-weekly distance learning through live, Internet "cyber classes." Additional graded work includes a number of large-scale projects completed under faculty supervision, resulting in significant written reports and oral presentations.

Applications to this program are accepted for a fall entry only. The early application deadline is May 1, and the final application deadline is August 1, each year. Scores from either the Graduate Management Admission Test (GMAT) or the Graduate Record Examination (GRE) are required as part of a complete application.

The program will not be offered in those years in which the enrollment is not sufficient.

DUAL J.D.-MBA PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student approximately 15 hours (one semester hour of credit toward the MBA degree that would be required to earn both degrees independently.

The establishment of the dual program recognizes the increasingly complex body of knowledge necessary to the creative conduct of business administered law practice, the complementary nature of many aspects of the graduate programs of the College of Law and the College of Business Administration, and the intellectual benefits inherent in the concurrent study of both business and business-related law. The program is designed to accommodate the interests of students who (a) contemplate a career in public service and want to acquire the skills and perspective of the lawyer and the business-oriented manager, (b) contemplate a career in business management and want to acquire the skills and perspective of a lawyer, or (c) contemplate a career as a lawyer specializing in business-related law and want to acquire the skills and perspective of the business-oriented manager.

Admission Requirements

Applications for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law and the College of Business Administration. The approval of the student's progress through the Program Committee will determine eligibility. Upon receipt of the application, the College of Business Administration will award up to 6 semester hours of credit toward the MBA for acceptable performance in approved graduate-level courses offered in the College of Business Administration. The College of Business Administration will award up to 6 semester hours of credit toward the MBA for acceptable performance in approved courses offered in the College of Law. The approval of courses is the responsibility of the Dual Program Committee and the student’s assigned advisor.

Students may begin their studies in either the J.D. or the MBA program, but may not enroll in MBA coursework while completing the first year of the law curriculum and may not enroll in J.D. coursework while completing the first year of the business curriculum. During the first year in the J.D. program, students register through the College of Law. During the first year in the MBA program, students register as graduate students. After the first two years, any term in which students take law courses or a mixture of law and graduate courses, they are classified and registered as law students. If taking only graduate courses, they are classified and registered as graduate students.

Approved Dual Credit

MBA courses in which the student has earned a B grade or higher and are to be counted toward the J.D. program must include 9 semester hours approved by the College of Law. The 6 hours of law courses in which the student has earned a 2.3 or C+ grade or higher and are to be counted toward the MBA must be selected from those approved by the Asst. Dean of the MBA Program.

DUAL M.S.-MBA PROGRAM

The College of Business Administration and the College of Engineering offer an integrated program leading to the conferral of the Master of Business Administration degree with a major in Business Administration (concentration in operations management) and the Master of Science degree with a major in Engineering Science (concentration in product development and manufacturing), Industrial Engineering (concentration in manufacturing systems engineering or product development and manufacturing), or Mechanical Engineering (concentration in product development and manufacturing). The Engineering Science program is intended to provide engineering majors an opportunity to graduate from the J.D. program with a flexible coursework plan based on their undergraduate degree.

The Industrial Engineering program is also open to students with undergraduate engineering majors other than industrial engineering.

Curriculum

A dual program candidate must satisfy the graduation requirements of each college. Students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual program.

The College of Law will award up to 9 semester hours of credit toward the J.D. for acceptable performance in approved graduate-level courses offered by the College of Business Administration. The College of Business Administration will award up to 6 semester hours of credit toward the MBA for acceptable performance in approved courses offered in the College of Law. The approval of courses is the responsibility of the Dual Program Committee and the student’s assigned advisor.

Students may begin their studies in either the J.D. or the MBA program, but may not enroll in MBA coursework while completing the first year of the law curriculum and may not enroll in J.D. coursework while completing the first year of the business curriculum. During the first year in the J.D. program, students register through the College of Law. During the first year in the MBA program, students register as graduate students. After the first two years, any term in which students take law courses or a mixture of law and graduate courses, they are classified and registered as law students. If taking only graduate courses, they are classified and registered as graduate students.

Approved Dual Credit

MBA courses in which the student has earned a B grade or higher and are to be counted toward the J.D. program must include 9 semester hours approved by the College of Law. The 6 hours of law courses in which the student has earned a 2.3 or C+ grade or higher and are to be counted toward the MBA must be selected from those approved by the Asst. Dean of the MBA Program.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate an increasingly complex body of knowledge for rapid introduction of new products to the marketplace. The objective of the dual degree program is to prepare graduates to take a leading management role in companies that must react quickly to a dynamic market where forces of competition require rapid changes in design and manufacturing and a short product development cycle.

Admission Requirements

Applications are accepted for fall semester only. Applicants for the Master of Business Administration degree program and the Master of Science degree program with a major in Engineering Science, Industrial Engineering, or Mechanical Engineering, and by the Dual Program Committee. During the first year in the MBA program, indicating on their application the intent to pursue the dual M.S.-MBA program and the appropriate engineering major (refer to the MBA program for separate instructions). Students accepted for both the MBA and the engineering degree programs will be assigned to Dual Program Committee advisors, who will be responsible for course approval and supervision of the students’ progress through the dual program.

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

Curriculum

All engineering students enrolled in the dual program must complete common coursework designed to provide them with an integrated, multidisciplinary teamwork experience. The MBA curriculum consists of 33 hours of common coursework in the College of Business Administration and 15 hours of common coursework in the College of Engineering. Engineering common coursework includes a culminating 3-hour integrated project course requiring a comprehensive report, and a final examination as required by the Dual Program Committee, to be taken during the first session of summer following the second year.

During the second year dual degree candidates will take courses in their engineering major. The coursework for each option is designed to provide students with a concentration in their major and advanced skills to accomplish their teamwork assignments.

Dual degree candidates enrolled in Engineering Science option are required to take 18 hours of graduate level engineering courses during the second year of the program. This option requires a coursework plan, approved by the Dual Program Committee, including a concentration such that the student can accomplish his/her teamwork assignments.
### Curriculum for Dual M.S.-MBA Degree

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>August—First Year</td>
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<tr>
<td>BA 511</td>
<td>MBA Core I</td>
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<td>Fall—First Year</td>
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<td>BA 512</td>
<td>MBA Core II</td>
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<td>IE/ME 504</td>
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<td>MBA Core III</td>
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<td>Integrated Product, Process, and Manufacturing System Design</td>
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<td>Summer</td>
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<tr>
<td>— Internship</td>
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<td>BA 514</td>
<td>Integrated Business Simulation 3</td>
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<td>IE/ME 509</td>
<td>Multidisciplinary Project 1</td>
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<tr>
<td>Fall—Second Year</td>
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<tr>
<td>IE 511*</td>
<td>Business Planning and Commercialization</td>
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<td>IE/ME 509</td>
<td>Multidisciplinary Project 1</td>
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<td>— Engineering major</td>
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<td>Spring</td>
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<tr>
<td>— MBA “hub” course elective</td>
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<tr>
<td>— Engineering major</td>
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<td>Summer (first session)</td>
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</table>

*Students in manufacturing systems engineering concentration may substitute other selected IE courses for these courses.

### Program of Study

The Ph.D. normally requires four years of intensive study and research beyond the master’s degree. Typically, the first two years of a student’s program consist of coursework, writing, and research. The third and fourth years are invested in completion of courses, the comprehensive exam, and completion of the dissertation. It is emphasized that the Ph.D. program of study is structured for full-time students only. Upon acceptance of a student by a particular departmental faculty, the student is expected to remain in residence until the dissertation has been completed and all requirements are met for completion of the Ph.D.

Since the program focuses on the development of competent scholars, heavy emphasis is placed on both teaching and research skills. As part of the doctoral program, each student is required to serve as a teaching assistant to an undergraduate business class or as a research assistant to a senior faculty member. Students with strong teaching skills may be assigned their own classes. Typically, the College of Business Administration offers financial support for doctoral students during their tenure in the program. The Ph.D. program is highly flexible, offering a wide array of concentrations and cognates. Moreover, heavy emphasis is placed on individualized instruction and close student-faculty interaction. Instruction takes the form of regular classes, doctoral seminars, and independent study and research. Students are also encouraged to attend lectures and discussions by visiting scholars throughout the year.

There are seven concentrations offered in the Ph.D. program:
- Accounting
- Finance
- Human Resource Development
- Logistics and Transportation
- Management (Operations Management and Strategic Management)
- Marketing
- Statistics

More detailed information concerning these specific areas is available by writing directly to each department or by accessing the College of Business Administration web page.

### Degree Requirements

Doctoral students must file a program of study that has been approved by their doctoral committee within one year of completing their first year of doctoral studies. This committee is nominated by the department chairperson in a student’s intended area of concentration, subject to the Graduate Council’s policies and procedures. Following are specific degree requirements:

1. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.
2. Students are required to have a sound and broad base on which to build their Ph.D. coursework. The departmental doctoral advisor will work with the student to determine what, if any, courses need to be completed. All such work is subject to approval by the temporary doctoral advisory committee and the Dean of the MBA Program. Specific concentrations may have prerequisites.
3. Research Tools: A minimum of 9 semester hours of graduate research methods must be completed. At least 6 semester hours in statistics courses beyond Statistics 531 are required. The remaining 3 semester hours may be completed in additional statistics courses (include Statistics 531) or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

4. Concentrations: The concentration is the focal point of the Ph.D. program. Students are expected to master the literature and research techniques in the concentration area and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 12 semester hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work taken in the concentration at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available concentrations are: accounting, finance, logistics/transportation, management (operations management and strategic management), marketing, and statistics. See the appropriate fields of instruction for specific course requirements.

5. A minimum of 9 semester hours of graduate coursework is required in an area outside, but complementary to, the concentration. The student may choose the cognate from one of the following: one of the seven concentration business areas listed above, economics, or a related area in another school or college of the University. Hybrid cognates combining courses from multiple disciplines are permitted with the approval of the doctoral advisor and the temporary doctoral advisory committee.

### Comprehensive Examinations

Comprehensive written examinations over the concentration area are required of each person seeking candidacy for the Ph.D. degree. This examination is administered in two sessions of approximately four hours each. Students qualify in the cognate area by completing a one-session, four-hour examination or an equivalent jointly approved by the student’s major professor and the student’s advisor in the cognate area. Comprehensive examinations are generally offered during the fall and spring terms. Comprehensive examinations must be taken within five years of matriculation.
When either the concentration or cognate area examination is passed, the remaining examination must be passed within the next 13 months.

Doctoral Committee

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

Admission to Candidacy

Students may apply for admission to candidacy for the Ph.D. after maintaining at least a “B” average in coursework, successful completion of comprehensive examinations, and acceptance of a research proposal for the dissertation by the student’s doctoral committee.

Admission to candidacy must be approved at least one full semester prior to the date the degree is conferred. (Admission in the fall permits graduation in the following spring semester.) Application for admission to candidacy must include a listing of all courses taken in each of the fields required for the degree (business functional areas, basic disciplines, concentration and cognate area). Graduate courses accepted from other institutions must be included. Under “Other Requirements,” the date of acceptance of the research proposal by the doctoral committee should be indicated. The application must be approved by the student’s doctoral committee and the Associate Dean before submission to the Office of the University Registrar.

Dissertation

Minimum of 24 semester hours: The student must complete a dissertation embodying the results of original research demonstrating the ability to do scholarly writing. The dissertation is supervised by the candidate’s doctoral committee, which must certify its completion and acceptability after oral defense of the candidate’s research effort.

The dissertation normally must be completed within three years of the student’s advancement to candidacy.

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 graduate 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.

501 MBA Career Development (1) Career opportunities available in each concentration. Prereq: Admission to MBA program and consent of Assistant Dean of MBA Program. Satisfactory/No Credit grading only.

506 Enterprise Process Redesign (3) Enterprise Resource Planning (ERP) software as primary tool for redesigning business processes. Management methods, tools, and techniques used for enterprise value redesign, value management, consensus management, project management, and implementation methodologies. Configuration of ERP module and business-to-business e-commerce tools. (Same as Information Management 561.)

510 Customer Responsive Management (3) Management methods that provide flexibility required to respond to diverse customer needs and to adapt to competitive, technological, and operational change. Mass customization, interactive marketing, capacity management economics, and relationship management for industries: health care, consulting, temporary services, professional services, repair services, truck load transportation, emergency response organizations, customer service centers and other responsive organizations.

511 MBA Core I (3) Essential skills of manager: basic interpersonal skills, problem-solving, building and written and oral communication skills. Finance and accounting fundamentals. Introduction to integrated value chain. (Prereq: A student may graduate with consent of Assistant Dean of MBA Program. S/N only.)

512 MBA Core II (15) Development of roles and responsibilities of business managers. Functional fundamentals: marketing, operations, human resource management, financial management. Continuation of board and written communication. Mass customization, interactive marketing, capacity management economics, and relationship management for industries: health care, consulting, temporary services, professional services, repair services, truck load transportation, emergency response organizations, customer service centers and other responsive organizations.

513 MBA Core III (9) Continuation of the functional fundamentals from 512. Integration of value chain: supply management and resource management. Capital integration experience using information technology. (Prereq: 511 and 512 or consent of Assistant Dean of MBA Program.)


515 MBA Capstone (1) The course is the capstone experience in the full-time MBA Program. It is designed to allow students to integrate and utilize the skills and knowledge they have acquired in the program, by applying them to real world business problems. Working in teams, students will participate in one of several types of projects, including but not limited to a comprehensive case analysis and competition, development of a business plan, or a consulting project with a non-profit or other type of existing organization. They will be required to deliver both a written and oral presentation of their work at the end of the semester. Prerequisites are BAS511, BAS512, and BAS513 or consent of Assistant Dean of the MBA Program. S/N only.


561 Management Project I (3) Company project. Preliminary investigation of significant strategic issue or new initiative program or significant organizational change to enhance organizational effectiveness) in sponsoring organization. Work within firm under guidance of faculty. Proposal to be approved by company and faculty. (Prereq: Admission to executive program of MBA and cooperation of sponsoring organization. Coreq: 551.)

562 Management Project II (3) Company project. Continuation of 561. Diagnosis and analysis of strategic issue. Work within firm under guidance of faculty member. (Prereq: 561. Coreq: 552.)

563 Management Project III (3) Company project. Continuation of 562. Company project. Work within firm under guidance of faculty member. Proposal to be approved by company and faculty. (Prereq: Admission to MBA program or consent of Assistant Dean of the MBA Program.)

564 Management Project IV (3) Company project. Continuation of 563. Proposal to be approved by company and faculty member. May require approval of Dean of the MBA Program. May be repeated. Maximum 6 hrs. S/NC or letter grade.

599 Executive-In-Residence (3) Interaction with corporate executives from wide spectrum of business disciplines and discussion of domestic and international strategic planning as applied in major corporations. (Prereq: MBA core and consent of instructor.)

611 Seminar in Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophical science perspectives.

612 Seminar in Research Methods (3) Research processes: philosophical foundations, problem formulation, grounded theory, qualitative methods and analysis; measurement, validity and error, experimen-
Information Management

GRADUATE COURSES

431 Computer Mapping and Geographic Information Systems (3) (Same as Geography 411.)
501 Enterprise Process Redesign (3) (Same as Business Administration 506.)
511 Risk Management in Networked Business Environments (3) (Same as Accounting 542.)
512 Electronic Commerce (3) (Same as Accounting 542.)
521 Logistics and Supply Chain Analytical Techniques (3) (Same as Logistics and Transportation 509.)
522 Leveraging Information Through Descriptive and Prescriptive Modeling (3) (Same as Management Science 551.)
531 Geographic Software Design (3) (Same as Geography 516.)
532 Geographic Information Management and Processing (3) (Same as Geography 517.)
541 Advanced Database Systems (3) Advanced database issues including data modeling, database design, SQL programming syntax and structure, stored procedures, multi-user databases, web-enabled databases, and DB administration. This course uses the Oracle database system to discuss concepts and implement assignments. Prereq: 351 or consent of instructor.
542 e-Business (3) Internet technologies currently being used for implementation and control of e-business; security issues created by these technologies; the behavioral and organizational challenges being faced by firms that are integrating these technologies; and the impact of these Internet technologies on emerging business models. Comparison of traditional business models with e-Business models. Web application development using current web development tools requires programming skills. Prereq: 351 or equivalent.
549 Systems Analysis and Design (3) Methodology used in analyzing, designing, and implementing information systems. This entails creating new systems, improving existing systems, streamlining business processes, reducing costs with technology, and managing organizational change. Students use programming logic, interface design, and system integration techniques. Prereq: 541.

Chemical Engineering

(College of Engineering)

MAJOR DEGREES

Chemical Engineering.................. M.S., Ph.D.
John R. Collier, Head

Professors:
Bienkowski, Paul R., Ph.D. .................. Purdue
Cochran, Hank D. (Adjunct), Ph.D. ......... M.I.T.
Collier, John R., Ph.D. ..................... Case Western Reserve
Counsel, Robert M., Ph.D. .................. Tennessee
Moore, Charles F. (Alumni Professor), Ph.D. ............... Louisiana State
Sheth, Atul C. (UTSI), Ph.D. ............... Northwestern

Associate Professors:
Bruns, Duane D., Ph.D. ..................... Houston
Edward, Brian J., Ph.D. ....................... Delaware
Frymier, Paul D. (Liaison), Ph.D. .......... Virginia
Petruian, Simiono (Research), Ph.D. ................. Iasi Tech

Wang, Tse-Wei, Ph.D. ....................... M.I.T.
Weber, Frederick E., Ph.D. ............... Minnesota
Assistant Professors:
Kerrer, David J., Ph.D. ..................... Minnesota
Emeriti Faculty:
Prados, John, Ph.D. .......................... Tennessee

Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy in Chemical Engineering with concentrations in chemical engineering, chemical bioengineering, advanced control systems, and polymer science and engineering.

THE MASTER'S PROGRAM

Thesis Option: The standard master's program includes a thesis and leads to the Master of Science. Minimum departmental requirements are as follows:
1. A total of at least 21 hours in graduate coursework in chemical engineering and related areas excluding thesis. The minimum requirements are 15 hours in chemical engineering; 3 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 3 hours chosen from either of these two categories.
3. Active participation in graduate seminars in the department. Resident students must register for Che 501 every semester it is offered.
4. A final oral examination covering the thesis, related fields and graduate coursework.

Non-Thesis Option: Under certain conditions, a candidate may apply for a non-thesis program. To be eligible, a candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. The departmental faculty will consider each application individually. Upon acceptance, the requirements for completion of the non-thesis option are as follows:
1. A total of at least 33 hours in graduate courses in chemical engineering and related areas. The minimum requirements are 18 hours in chemical engineering; 6 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 9 hours chosen from either of these two categories.
2. Completion of a critical review of the literature and other sources in an area related to chemical engineering (Che 580).
3. A written comprehensive examination over the major field and an oral examination covering the review paper and related areas.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the department. The dissertation may be offered as such evidence.

Department requirements consist of the satisfactory completion of:
1. Graduate courses in chemical engineering, amounting to approximately 24 semester hours, at least 9 of which must be in 600 series courses.
2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.
3. The comprehensive examination, consisting of a written part and oral part. The written comprehensive examination covers thermodynamics, reactor analysis, and transport phenomena and separations.
4. Active participation in graduate seminars conducted by the department. Resident students must register for ChE 501 every semester offered.

CERTIFICATE IN MAINTENANCE AND RELIABILITY ENGINEERING

The College of Engineering offers a certificate program in maintenance and reliability engineering. The program is designed primarily for part-time students in that several of the courses are available through distance education.

The 12-credit certificate is earned by completing 483 and 484, which are cross-listed among all participating departments in the College of Engineering, plus two elective courses selected from a list of courses provided by the participating departments.

Currently, the available elective courses are Chemical Engineering 561, Industrial Engineering 516 and 591, Mechanical Engineering 534 and 599, and Nuclear Engineering 579 and 585. The selection of elective courses is determined through an advising conference with each individual student, and is based on the student's personal interests, academic background, and work experience. Applicants must meet the minimum criteria established by the Graduate Council.

GRADUATE COURSES

467 Honors: Engineering Internship in Process Control (4) Selected students work in small groups on industrial problems in process dynamics and control. Directed by faculty and engineers from host company. Prereq: Process Dynamics and Control and consent of instructor.
477 Honors: Applied Process Automation Laboratory (3) Interfacing flexible batch continuous processes to automation systems. Top down analysis with bottom up implementation, hierarchical structures and object oriented concepts used to design automation solutions: human-machine-interfaces. Workstations with modern industrial equipment, interactive graphics and visualization environment. Prereq: Process Dynamics and Control and consent of instructor.
483 Introduction to Reliability Engineering (3) (Same as Nuclear Engineering 483, Industrial Engineering 483, and Mechanical Engineering 483.)
484 Introduction to Maintenance Engineering (3) (Same as Nuclear Engineering 484, Industrial Engineering 484, Materials Science and Engineering 484, and Mechanical Engineering 484.)
580 Technical Review and Assessment (3) Preparation of critical review of literature in area related to chemical engineering. Prereq: consent of instructor. May be repeated. Maximum 6 hrs.
581 Industrial Pollution Prevention (3) Principles and practical aspects of industrial waste minimization. Prereq: consent of instructor. May be repeated. Maximum 6 hrs.
585 Process System Reliability and Safety (3) May be repeated. Maximum 6 hrs.
600 Doctoral Research and Dissertation (3-15) P/NP only.
631 Advanced Topics in Statistical Thermodynamics and Molecular Dynamics (3) Statistical thermodynamics, molecular based computer simulations. Prereq: consent of instructor. May be repeated. Maximum 6 hrs.
647 Advanced Transport Phenomena (3) Theory of mass, momentum, and energy transport in reactive and non-reactive systems. Prereq: consent of instructor. May be repeated. Maximum 6 hrs.
661 Advanced Topics in Process Dynamics and Control (3) May be repeated. Maximum 6 hrs.
691 Advanced Topics in Chemical Engineering (3) May be repeated. Maximum 6 hrs.

Chemistry

MAJOR

Chemistry ........................................... M.S., Ph.D.
Michael Sepaniak, Head

Professors:
Adcock, J. L., Ph.D. ........................... Texas
Baker, D. C. (Paul and Wilma Ziegler Professor), Ph.D. ............................. Ohio State

Barnes, C. E., Ph.D. .............................. Stanford
Bartmess, J. E., Ph.D. .......................... Northwestern
Chambers, J. Q., Ph.D. ............................ Kansas
Compton, R. N., Ph.D. ............................ Tennessee
Cook, K. D., Ph.D. .............................. Wisconsin
Dunning, T. (Distinguished Scientist), Ph.D. ............................... California Institute of Technology
Feigerle, C. S., Ph.D. .............................. Colorado
Guichon, G. (Distinguished Scientist), Ph.D. ............................... Ecole Polytechnique and Paris VI
Kabalka, G. W. (Robert H. Cole Professor, Distinguished Professor), Ph.D. ............................... Purdue
Kovac, J. D., Ph.D. ............................... Yale
Larese, J. Z., Ph.D. ............................... Wesleyan (Connecticut)
Magid, L. J., Ph.D. ............................... Tennessee
Magid, R. M., Ph.D. ............................... Yale
Mays, J. W. (Distinguished Professor), Ph.D. ............................... Akron
Pagni, R. M., Ph.D. ............................... Wisconsin
Schweitzer, G. K. (Distinguished Professor), Ph.D. ............................... Illinois
Sepaniak, M. J., Ph.D. ............................. Iowa State
VanHool, W. V. (Paul and Wilma Ziegler Professor), Ph.D. ............................... Johns Hopkins
Williams, T. F. (Distinguished Professor), Ph.D. ............................... London
Woods, C. III, Ph.D. ........................... NC State
Xue, Z. B., Ph.D. ............................... California

Associate Professors:
Dadmun, M. D., Ph.D. ........................... Massachusetts
Hinde, Robert J., Ph.D. ............................ Chicago
Muskfeldt, J. L., Ph.D. ............................. Florida
Schell, F. M., Ph.D. ............................... Indiana

Assistant Professors:
Gilman, S. C., Ph.D. .............................. Penn State
Turner, J. Ph.D. ................................. Oxford
Young, D. G., Ph.D. ............................. Ohio State
Zhao, B., Ph.D. ................................. Akron
Zhang, X. P., Ph.D. ............................... Pennsylvania

The Faculty of the Department of Chemistry at The University of Tennessee seek to prepare their students to join the international ranks of professional chemists in fundamental areas of chemistry as well as cross-disciplinary sciences in which chemical expertise plays a critical role in the development of new knowledge and technologies. Students planning to major in Chemistry for the master’s or doctoral degree will ordinarily have attained a satisfactory record in the traditional areas of chemistry. The Department, however, recognizes that modern chemistry transcends traditional disciplinary divisions. Therefore, it encourages students with undergraduate majors in chemical engineering, the biological sciences, physics, mathematics, computer science, or other fields to apply for admission to our program.

Admission to the graduate program and a student’s course of study in graduate school are decided on a case-by-case basis, taking into consideration an applicant’s undergraduate record (traditionally including one year, each, of general, analytical, organic, and physical chemistry, and one-half year of inorganic chemistry), performance on national graduate school tests, and departmental diagnostic exams. All applicants are required to take the general Graduate Record Examination.
THE MASTER'S PROGRAM

The department offers concentrations in six areas for the M.S.: analytical chemistry, environmental chemistry, inorganic chemistry, organic chemistry, polymer chemistry, and physical chemistry.

The requirements for the M.S. in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 500.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar. (No more than 2 hours may be applied to the course requirements.)
3. Prescribed courses based on performance on diagnostic examinations.
4. Sufficient graduate coursework in chemistry (at the 400 level or above) and/or a related field to make an overall total of 30 hours, including one of the following sequences: 510-11-12, 530-31-32, 550-51-52, 570-72-73, 580-94-95. At least 14 hours of this graduate coursework must be at the 500 level or above.
5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers concentrations in eight areas for the Ph.D.: analytical chemistry, physical chemistry (in cooperation with the Department of Physics), environmental chemistry, inorganic chemistry, organic chemistry, polymer chemistry, and theoretical chemistry.

The requirements for the Ph.D. in Chemistry (except for the chemical physics concentration) consist of the satisfactory completion of:

1. Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 600. Registration must be continuous from the beginning of research.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar.
3. Prescribed courses based on performance on diagnostic examinations.
4. Completion of the comprehensive examination series and defense of an original research proposal to give 2 hours of credit in Chemistry 601.
5. Eighteen additional hours in courses at the 500 level or above including at least one course above 601 and one of the following sequences: 510-11-12, 530-31-32, 550-51-52, 570-71-72-73, and 580-94-95.
6. A final oral examination.

The Ph.D. program with concentration in chemical physics is conducted jointly with the Department of Physics. Requirements depend on the choice of the major department. Chemistry departmental requirements include passing the above degree requirements in chemistry with concentration in physical chemistry plus 6 additional hours in physics at the 500 level or above. Three of the additional physics hours can be used to satisfy the 18 hours requirement in item 5.

GRADUATE COURSES

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure; bonding, structure of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq: 430 Inorganic Chemistry.


471-81 Biophysical Chemistry (3,3) (Same as Biochemistry and Cellular and Molecular Biology 471-481.)

473-83 Physical Chemistry (3, 3) Students may not receive credit for both 471 and 473 nor for both 481 and 483. 473 - Properties of gases; first, second and third laws of thermodynamics; chemical equilibria; simple phase equilibria; properties of solutions. 483 - Introduction to statistical thermodynamics; kinetics of chemical reactions; introduction to quantum mechanics and applications to electronic structure of atoms and molecules; molecular spectroscopy. Prereq: General Chemistry, Elements of Physics or Fundamentals of Physics: Electricity and Magnetism, and Calculus III.

479-89 Physical Chemistry Laboratory (2,2) Experiments on topics discussed in 471-81 or 473-83. Prereq or coreq: Corresponding courses 471 or 473 for 479 and 481 or 483 for 489. 1 lab.

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

501 Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. S/NC only.

502 Registration for Use of Facilities (1-15) 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.

505 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses. Prereq: Consent of department. May be repeated. Maximum 6 hrs. S/NC only.

510 Analytical Spectrometry (3) Principles and practice of optical and mass spectrometric techniques in quantitative chemical analysis. Required background: Two semesters of physical chemistry.

511 Analytical Separations (3) Principles and practice of chemical separations based on extraction, chromatographic, and electrophoretic phenomena. Required background: Two semesters of physical chemistry.

512 Electroanalytical Chemistry (3) Fundamentals of electrode processes; principles and practice of electroanalytical techniques in quantitative chemical analysis. Required background: Two semesters of physical chemistry.

530 Chemical Bonding (3) Wave mechanical atom, group theory, quantum approach to molecular orbital theory, valence, ionic, and metallic bonding, ligand field theories, solid state. Required background: One semester of inorganic chemistry.

531 Characteristic of Inorganic Compounds (3) Descriptive chemistry of elements; structure, reactions, kinetics, mechanisms, equilibria, and spectra of coordination, organometallic, bioinorganic compounds. Required background: One semester of inorganic chemistry.

532 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, ESR, nuclear quadrupole, Mossbauer, mass, and photoelectron spectroscopies for characterization of inorganic compounds. Required background: One semester of inorganic chemistry.

540 Nuclear and Radiochemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiation detection. Required background: Two semesters of physical chemistry.

550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformational analysis, and reactions of functional groups. Prereq: 500 Inorganic Chemistry.


552 Organic Reaction Mechanisms (3) Techniques and principles in study of organic reaction mechanisms; applications and reactions in polar, radical, and pericyclic reactions; reactive intermediates. Prereq: 550.


554 Organic Spectroscopy Laboratory (1) Use of IR, UV, MS and nuclear multifrequency NMR spectrometers. Development of problem-solving ability in area of spectroscopic characterization of organic molecules. Prereq: 360 or equivalent. Coreq: 553.

570 Quantum Chemistry and Spectroscopy (3) Basic principles of quantum mechanics and their applications to molecular orbitals, molecular structure, and spectroscopy; introduction to group theory. Required background: Two semesters of physical chemistry.

571 Advanced Quantum Chemistry and Spectroscopy (3) Prereq: 570 or consent of instructor.

572 Thermodynamics and Statistical Mechanics (3) Macroscopic and microscopic description of equilibrium systems. Basic principles of thermodynamics and statistical mechanics, and application to selected chemical systems. Required background: Two semesters of physical chemistry.

573 Chemical Kinetics and Transport (3) Time-dependent phenomena in chemistry: chemical kinetics, chemical dynamics, transport theory. Required background: Two semesters of physical chemistry.

590 Polymer Chemistry (3) Fundamentals of polymer synthesis and characterization through application of organic and physical chemical principles. Required background: Two semesters each of organic and physical chemistry.


595 Physical Chemistry of Polymers (3) Conformation of macromolecules, solution and bulk properties, rubber elasticity, kinetics of polymerization, polymer thermodynamics. Prereq: 590 or equivalent.

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

601 Chemistry Research Proposal (2) Preparation and oral defense of original written research proposal based on thorough survey of chemical literature. Prereq: Consent of department head. S/NC only.

610 Selected Topics in Analytical Chemistry (3) Topics of current significance. Prereq: 510-11-12 or consent of instructor. May be repeated. Maximum 12 hrs.

630 Selected Topics in Inorganic Chemistry (3) Topics of current significance. Prereq: 530-31-32 or consent of instructor. May be repeated. Maximum 12 hrs.

650 Selected Topics in Organic Chemistry (3) Topics of current significance. Prereq: Two of 550-51-52 or consent of instructor. May be repeated. Maximum 12 hrs.

670 Selected Topics in Physical Chemistry (3) Topics of current significance. Prereq: 570-72-73 or consent of instructor. May be repeated. Maximum 12 hrs.
690 Selected Topics in Polymer Chemistry (3) Topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

691 Selected Topics in Thermal Analysis of Polymeric Materials (3) Topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Maximum 3 hrs may be applied toward degree in chemistry.

**Child and Family Studies**

(College of Education, Health, and Human Sciences)

**MAJORS DEGREES**

Child and Family Studies .................. M.S.

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

Gary W. Peterson, Head

Professors:

Barber, Brian K., Ph.D. ............... Brigham Young
Blanton, Priscilla, Ed.D. .............. Tennessee
Buehler, Cheryl, Ph.D. ................. Minnesota
Cunningham, Jo Lynn, Ph.D. .......... Michigan State
Fox, Greer Litton, Ph.D. ............. Michigan
Moran, James D., Ph.D. .............. Oklahoma State
Norquist, V. Mick, Ph.D. .............. Tennessee
Peterson, Gary W., Ph.D. ............. Brigham Young
Twardosz, Sandra, Ph.D. ................ Kansas

Associate Professors:

Allen, Jan, Ph.D. ......................... Purdue
Malia, Julia, Ph.D. ...................... Iowa State
Smith, Delores, Ph.D. ................. Oklahoma State
Tegano, Deborah, Ph.D. .............. Virginia Tech

Assistant Professors:

Brandon, Denise, Ph.D. ............... Tennessee
Devereaux, Matt, Ph.D. ............... Tennessee
Moran, Mary Jane, Ph.D. ............. New Hampshire
Wass, Tara, Ph.D. ........................ Denver

The Department of Child and Family Studies offers graduate programs leading to degrees, majors, and concentrations in:

**Master of Science**

Child and Family Studies

Early Childhood Education

**Doctor of Philosophy**

Human Ecology

Child and Family Studies

The Department of Child and Family Studies (CFS) provides both masters and doctoral degrees. Our graduate programs are based on the model of the "empirically-based professional" person. Graduate students learn to conduct research on child development, family studies, and educational environments in accordance with established standards of scientific inquiry and evaluation. CFS graduate programs seek to produce researchers, scholars, and educators who are capable of independent investigation of family and developmental processes. Students also receive training in how to conduct scientifically based assessments of prevention, intervention and educational strategies. Many opportunities exist in CFS for graduate students to become involved in research on children, youth, and families. The central premise of graduate programs in CFS is the idea that scientific inquiry provides the most effective means to improve the welfare of children, youth, and families.

A cornerstone idea for CFS graduate programs is "development in context," or the perspective that human development is best understood in terms of interconnections among families, neighborhoods, schools, communities, cultures, and international environments. A more specific focus within this "development in context" perspective is an emphasis on "children, youth, and families at risk." Together, these two themes, "development in context" and "children, youth, and families at risk," are the foundations upon which our graduate curriculum options are structured.

**ADMISSION REQUIREMENTS**

A completed file for review includes a departmental application, Graduate Record Examination (GRE) scores for the general section, and completion of three Graduate Rating Forms by individuals who can attest to the applicant's potential for graduate education. Forms may be obtained from the department or departmental link on the college web site: http://www.cehhs.utk.edu/departments.html.

Admission to the program is contingent upon faculty evaluation of GRE scores, undergraduate/graduate GPA, rating forms, work experience, and the match between student's goals and department's faculty. Prerequisites to admission to the master's program are 9 semester hours of upper division undergraduate social science. Prerequisites to the doctoral program are a master's degree from a regionally accredited institution or equivalent, completion of the 12-hour foundation core in the CFS master's program, 3 hours of computationally-based, graduate-level statistics, and completion of a thesis as part of the master's degree.

**THE MASTER'S PROGRAM**

The Master of Science degree in Child and Family Studies provides a broad foundation for understanding how children develop and how families function in today's society. All master's candidates enroll in CFS foundation courses which include theoretical and empirical surveys of the human development, child development, and family science literatures plus a survey of methods of discovery used in child and family research. All MS students are expected to engage in productive research culminating in a thesis or project. Students choose to concentrate either in Child and Family Studies, leading to doctoral study or careers in community agencies serving children and families, or Early Childhood Education, leading to an educator career in early childhood or school settings.

The Child and Family Studies concentration requires a minimum of 36 credits of coursework: 12 credits in foundation coursework and 24 credits in specialization. The CFS foundation courses include CFS 510, 511, 550, and 570. The 24 additional credit hours, selected with guidance of the student's master's committee, are earned as follows: 9 CR in CFS-prefix courses, 6 CR in graduate electives, which may include CFS-prefix courses, 3 CR in Statistics 531, Statistics 537 or Social Work 605, and 6 CR of thesis research in CFS 500. Students seeking the M.S. with a major in Child and Family Studies must select a major's committee chair and file a plan of study with the department head after 12 hours of graduate credit.

**I. MS in Child and Family Studies**

CFS Foundation Courses 12 CR

CFS 510 Theories of Human Development

CFS 511 Research in Child Development

CFS 550 Theory and Research in Family Studies

CFS 570 Research Methods in CFS

**Computation-based Statistics 3 CR**

Stat 531 Survey of Statistical Methods or
Stat 537 Statistics for Research or
Sw 605 Analysis of Social Work Data

CFS Specialization Electives 9 CR

Three CFS-prefix graduate courses; may not include directed study courses CFS 581 or 620; may include only 3 CR of special topics courses CFS 580 or CFS610.

**General Electives 6 CR**

Courses may be CFS-prefix courses or may include courses from outside the CFS curriculum.

**Thesis Research 6 CR**

CFS 500

Total 36 CR

The Early Childhood Education concentration is designed for students seeking a MS degree along with initial teacher licensure in early childhood education (Pre-K through Grade 4). Students interested in a CFS MS degree in ECE must apply for admission to graduate study in CFS through the procedures outlined above. (Application for admission to the fifth year licensure program in CFS ECE is a separate procedure and is described in the CFS undergraduate catalog. Admission to the fifth year licensure program does not include admission to the CFS MS in ECE program.) The course of study for CFS MS in ECE students includes 12 CR in the CFS foundation courses: CFS 510, 511, 550, and 569. 18 CR in ECE core: CFS 512, 574, 575, 591; 3 CR of computation- or consumer-based graduate statistics (Statistics 531, Statistics 537, Social Work 605, or EP 550), 3 CR in ECE specialization electives, completion of a research project in CFS 569, and a written comprehensive examination (36 credits).

**II. MS in Early Childhood Education**

CFS Foundation Courses 12 CR

CFS 510 Theories of Human Development

CFS 511 Research in Child Development

CFS 550 Theory and Research in Family Studies

CFS 569 Action Research in Early Childhood Education
Early Childhood Education Core (includes licensure) 18 CR
CFS 512 Research in Early Childhood Education (3)
CFS 574 Analysis of Teaching for Professional Development (1 cr)
CFS 575 Professional Internship in Teaching (12 cr)
CFS 591 Clinical Studies (2 cr)

Computation- or Consumer-based Statistics 3 CR
Stat 531 Survey of Statistical Methods 1 or Stat 537 Statistics for Research 1 or
SW 605 Analysis of Social Work Data 1 or CEEP 520 Statistics and Research Design

ECE Specialization Electives 3 CR
Elected from list of courses with prior committee approval.

Research Project in Lieu of Thesis CFS 569 Action Research in Early Childhood Education

Written Comprehensive Exam

Total 36 CR

THE PH.D. PROGRAM

The department supports a doctoral program leading to a Ph.D. in Human Ecology. Two themes are highlighted: the integration of human development and family studies and concentration in a selected area of study. A doctoral program that is concurrently specialized and integrative in nature reflects the complexity of the disciplinary subject matter, provides a broader context to formulate theoretical questions, and broadens the empirical literature for addressing those questions.

Requirements include:
1. Completion of the foundation courses in the Master’s program: 510, 511, 550, and 570.
2. Completion of the doctoral core: 640, 634, 691 or 650.
5. Three credits of advanced statistics.
6. Minimum 3 credits in specialized research methods.
7. Selection of one of the following specializations: teaching in higher education (requires UT GTA seminar, 3 credits of college teaching methods and one semester of supervised teaching experiences); administration in community services (requires 566 or 563, 521 or SW 541, and one semester of an administrative apprenticeship); research emphasis requires 6 additional credits in research methods or statistics.
8. Minimum of 6 credits in a cognate area.
10. Minimum of 96 credits beyond the bachelor’s degree.

GRADUATE COURSES

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

502 Registration for Use of Facilities (1-15) Re- quired for the student not otherwise registered during any semester when student uses University facilities and/or facility time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

505 Development of Interpersonal and Supervision Skills (3) Refinement of interpersonal skills needed to work with families and other professionals. Supervisory training in others’ skill development, active listening, self-disclosure, relationship building, and negotiation. Skilled for use among family members.

510 Theory in Human Development (3) Theoretical models of human development: cognitive, social learning, and ecological theory; analysis, synthesis, and discussion of historical and contemporary relevance of models; application of theory to research, prevention, intervention, and education; critical reading and evaluation of theory-based research on human developmental processes.

511 Survey of Research in Child Development (3) Survey of human development research from conception through adolescence. Classic and contemporary empirical literature in domains of physical, cognitive, language, social, and motor development; biological basis of development of cross-cultural perspectives.

512 Survey of Research in Early Childhood Education (3) Current literature and issues in early childhood education. Prereq: 510 or equivalent or consent of instructor.

515 Children in Contemporary Society (3) Theory and research on environmental and developmental issues in contemporary family situations and educational environments for children from infancy through middle childhood. Implications for programs and policy.

522 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems faced by parents and teachers; methods available to modify problem behavior.

525 Seminar on Play (3) Comparison and contrast of theoretical framework and research methodologies on play. Developmental perspective on play.

530 Families of Children with Disabilities (3) Developmental nature of families’ experiences in caring for handicapped children, especially during infancy and early childhood.


545 Family Resource Management and Instruction (3) Design and implementation of family resource management curriculum for family life education audiences, both professional and community programs; planning and evaluating family resource management programs.

546 Family Violence (3) Family violence and the interface of child development and family studies: divorce and remarriage, patterns and negotiation. Skills adapted for use among family members.

547 Family Violence (3) Theories and research on initiation, maintenance and cessation of violent behaviors in intimate family contexts, and assessment of responses to violent family behaviors, perpetrators, victims, and family systems. Prereq: 550.


564 Practicum in Human Development or Family Studies II (3) School and community programs concerned with education for human development and family living. Committee approved and supervised written project. S/NC only.

565 Practicum in Human Development or Family Studies I (3) School and community programs concerned with education for human development and family living. Committee approved and supervised written project. S/NC only.

566 Approaches to Family Intervention and Counseling (3) Various theoretical approaches for family intervention and counseling. Structural, strategic, experiential and social learning schools of practice. Effects of intervention from perspective of impact on family functioning and communication. Prereq: 565. (Same as Counseling Education and Counseling Psychology 566.)


571 Research Seminar (1) Presentation and critique of research projects. Prereq: Departmental major or consent of instructor. May be repeated. S/NC only.

574 Analysis of Teaching for Professional Development (1-2) Strategies to document and analyze effectiveness of teaching and of professional development. Study and application of various approaches. Coreq: 575.

575 Professional Internship in Teaching (1-8) Intensive teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to postbaccalaureate students in professional year program. Prereq: Admission to Teacher Education program. May be repeated. Maximum 12 hrs. S/NC only.

580 Special Topics in Human Development or Family Studies (1-3) Research, theory and current issues in child development and family studies; divorce, handicapped children, symbolic interaction, work and family, Piaget, mainstreaming children, theory and research in human sexuality, cognition. Prereq: 6 graduate hrs in major, or consent of instructor. May be repeated with different topics. Maximum 9 hrs.

581 Directed Study in Human Development or Family Studies (1-3) Individual learning experiences in specific topics in child development and early childhood education or family studies. Prereq: 6 graduate hrs or consent of instructor. May be repeated with different topics. Maximum 6 hrs.

591 Clinical Studies (1-4) Group and individual seminars and teaching activities during full-time internship. Application and evaluation of professional core competencies. Completion and presentation of portfolio and analysis of teaching project. Coreq: 575.

600 Doctoral Research and Dissertation (3-15) P/NP only.
610 Advanced Special Topics in Human Development or Family Studies (1-3) Study of research and theory related to current issues. Prerequisite: 12 graduate hours in major or consent of instructor. May be repeated with different topics. Maximum 6 hours.

620 Advanced Directed Study in Human Development or Family Studies (1-3) Advanced, in-depth individualized learning experiences in specific topics in child development, early childhood education, or family studies. May be repeated with different topics. Maximum 6 hrs.

625 College Teaching and Professional Roles in Human Ecology (3) Instructional effectiveness, technical, organizational, and evaluation in college teaching. Systems and ecological theoretical frameworks. Professional roles and responsibilities related to higher education programs in human ecology.

631 Adolescent Development in Families (3) Normative and nonnormative adolescent development: physical, cognitive, moral, social, familial, sexual, and personality. Prerequisite: 510, 511, and 550.

633 Survey Design and Analysis (3) (Same as Sociology 633.)

634 Advanced Survey of Family Theory and Research (3) Conceptualization, analysis, and critical assessment of pertinent conceptual and empirical literatures at advanced level for variety of contemporary family issues. Prerequisite: 570, master's core. Required background: 6 hrs graduate-level statistics.

640 Advanced Theory in Human Development (3) Original conceptualizations of and current theoretical perspectives influencing field of human development and empirical evaluations of these perspectives. Prerequisite: 550, 510, 511, or consent of instructor.

650 Advanced Qualitative Research Methods (3) Techniques and data analysis in qualitative research in human development and family studies. Use of methods: in-depth interviewing, participant observation, and case studies. Prerequisite: Communications 642 or Psychology 613.

652 Men and Families (3) Contemporary American men: primary psychological processes in sociological context. Reciprocal influence of society, men, and their families in relation to marriage and parenting. Prerequisite: 9 hrs of graduate family studies coursework.

653 Women and Families (3) Contemporary American women: primary psychological processes in sociological context. Reciprocal influence of society, women, and their families in relation to marriage and parenting. Prerequisite: 9 hrs of graduate family studies coursework.

670 Secondary Analysis of Survey Data (3) Applied seminar in computer analysis of survey data. Identification of data archives, accessing data, evaluation, and analysis of social science survey data. Nationally representative data sets relevant to study of families, youth, or children. SPSS analytic software. Prerequisite: 570 or equivalent, Statistics 532 or 537 or equivalent.

691 Analytic Reasoning (3) Analysis of quantitative methods and measures used in human development and family research: validity, reliability, causality, and generalizability. Prerequisite: 570. Required background: 9 hrs graduate coursework in child and family studies, and 6 hrs graduate-level statistics.

Civil and Environmental Engineering

(216x703)Civil Engineering offers degrees leading to the Master of Science in Environment and Doctor of Philosophy with a major in Civil Engineering. Specialization in civil engineering, environmental engineering, and transportation engineering; geotechnical/materials engineering, public works engineering, structural engineering, and transportation engineering; to the Master of Science in Environmental Engineering with concentrations in water quality, water resources, air quality, mixed waste management, waste management, and environmental risk assessment. For further information, visit the web site at http://www. engr.utk.edu/civil/.

THE MASTER'S PROGRAM

The Master of Science programs in Civil Engineering and Environmental Engineering are offered to graduates of recognized undergraduate curricula.

Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering, or certain undergraduate prerequisite courses must be taken before admission to candidacy for the Master of Science in Civil Engineering.

Civil Engineering

The Department of Civil and Environmental Engineering offers two options for the Master of Science with a major in Civil Engineering.

Thesis Option: A minimum of 30 semester hours, including 6 hours of thesis, is required.

Non-Thesis Option: A minimum of 33 semester hours, including 6 hours of thesis, is required.

THE DOCTORAL PROGRAM

A graduate program leading to the Doctor of Philosophy is offered in Civil Engineering. Specific departmental requirements for the Ph.D. degree include the following:

1. A minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 24 semester hours in 600-level Doctoral Research and Dissertation will be required.

2. A minimum of 24 semester hours of graduate courses in engineering, exclusive of thesis or dissertation credit, at least 6 hours of which must be 600-level courses.

3. Supporting courses in related scientific and engineering fields, amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 9 semester hours of mathematics will be required beyond the civil engineering undergraduate requirements.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

Environmental Engineering

For a Master of Science with a major in Environmental Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: Engineering Fundamentals 101, 102; Nuclear Engineering 203 or Mechanical Engineering 331; Basic Engineering 121, 131; Engineering Science and Mechanics 231; Statistics 251; Civil Engineering 390, 395, 380; Mathematics 141, 142, 231, 241; Chemistry 120, 130. In general, these must be completed with a B average before courses for graduate credit can be taken.
5. Upon completion of at least one-half of all coursework, each student must pass a comprehensive examination.

6. After completion of the dissertation, prior to graduation, each student must pass a comprehensive examination administered by a faculty committee.

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.

Civil Engineering

GRADUATE COURSES

421 Portland Cement Concrete Mix Design and Analysis (3) Aggregate properties and tests, tests of portland cement and concrete, mix design methods, concrete admixtures, nondestructive testing. Prereq: 251-2 hrs and 1 lab.

451 Highway Engineering (3) Design, construction, operation, and maintenance of highway facilities; application of various engineering principles and techniques to process of planning, locating and design of highway facilities; both geometric and pavement design. Prereq: 210, 251, 352.

452 Traffic Engineering (3) Characteristics of driver, vehicle, and roadway and their interrelationships; traffic studies; basic considerations of traffic circulation and control, lighting, capacity analysis, roadway safety analysis and design. Prereq: 210, 251, 352.

453 Airport/Railroad Planning and Design (3) Airport master planning and railroad engineering. Runway configuration, airfield capacity, geometrics and terminal layout and design. Railroad capacity, geometrics and system layout and design. Prereq: 210, 251, 352.

472 Steel Design (3) Design of plate girders and composite beams; consideration of members subject to combined stresses; design of typical framed buildings, connections. Prereq: 471.

474 Reinforced Concrete Design (3) Design of continuous beams, floor slabs, and columns with combined flexural and axial loads and bending, and deflection for torsion. Prereq: Introduction to Structural Design.

485 Principles of Hydrogeology (3) (Same as Geological Sciences 485).

490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam project, data acquisition; spillway and outlet works design; earthen and gravity dam stability analyses; drains and filters; maintenance and operation principles; and dam safety concepts, dam break analyses. Prereq: 390, 395.

495 Water Resources Development and Management (3) Principles of water resources project development planning and management. Institutional framework: water law, evaluation procedures for comparing and selecting among water resources development alternatives, multi-objective planning, principles of engineering economics, benefit-cost analysis, and cost allocation methods; environmental impact assessment procedures; decisions using risk-based methods; case studies. Prereq: Senior standing.

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

502 Registration for Use of Facilities (1-15) Re-enrollment for course registration 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.

510 Urban Systems: Engineering and Management (3) Various urban systems usually under responsibility of city manager and/or city engineer: streets, lighting, water, refuse collection, Personnel management, finance, planning and public relations. Prereq: Graduate standing or consent of instructor.

521 Pavement Design (3) Empirical and theoretical methods of pavement design and analysis; strengthening existing pavements, pavement distress and economical design alternatives. Prereq: 321 and 330.

522 Advanced Mix Design and Analysis for Asphalt and Portland-Cement Concrete (3) Aggregate properties and tests, asphalt binder properties and tests, mix design methods for asphaltic mixtures, hot-mix asphalt (HMA) mix-ture production and compaction, HMA mixture characterization and analysis, Portland-cement concrete (PCC) mix design, admixtures for PCC, special types of PCC, PCC production and construction. Prerequisite: CE 321.


532 Rock Mechanics and Rock Engineering (3) Engineering properties and characterization of rock and rock masses. Discontinuity analysis, stress and strain, keyhole theory, applications to rock slopes, underground excavations, foundations and groundwater flow. Prereq: Introduction to Soil Behavior or consent of instructor.

533 Advanced Laboratory and Insitu Testing of Soil (3) Instruments for measurement of electrical signals, static and dynamic transducers, data acquisition and control, insitu measurement of stress, pore pressure, deformation, load deformation behavior (seismic methods, static methods), advanced labora- tory shear strength and compressibility testing. Prereq: 300 Introduction to Soil Behavior. 2 hrs and 1 lab.

534 Geological Engineering (3) Influence of geological characteristics of rocks and soils; applications of geology in planning, design and construction of civil engineering projects. Prereq: Introduction to Soil Behavior 2 hrs and 1 lab.


537 Issues in Geotechnical Engineering (1-3) Special readings, studies, and presentations in geotechnical engineering. Prereq: Graduate standing or consent of instructor. May be repeated.

538 Finite Element Applications in Geotechnical Engineering (3) Application of finite element method to practical problems in geotechnical engineering. Constrained and unconstrained flow through porous media; two-dimensional stress and strain; two-dimensional elements; representation of nonlinear soil behavior, elastic and elastic-plastic models. Prereq: Introduction to Soil Behavior and Matrix Computation or equivalent. Taught concurrently with CE 538. Students may not receive credit for both 538 and 561.

539 Geotechnology Seminar (1) Seminar topics in geotechnical and geological engineering. Research contributions and case histories by graduate students and engineers and scientists from surrounding community. Prereq: Graduate standing and consent of advisor. May not apply toward degree. May be repeated. S/NC only.

540 Construction Management I (3) Management and organization of heavy and building construction projects. Prereq: Construction Methods and Equipment.

541 Construction Management II (3) Management organization of heavy and building construction projects. Prereq: Construction Methods and Equipment.

543 Construction Estimating (3) Project costs, estimating and takeoff techniques, market cost conditions, and feasibility and cost. Prereq: Construction Methods and Equipment.

552 Traffic Engineering-Operations (3) Signs, signals and marketing, short-term operations; controllers; signal timing/phasing; one-way reversible flow; system operations; identification and correction of high-accident locations and system deficiencies. Prereq: 551 or 452.

553 Geometric Design and Layout of Roadways and Community Facilities (3) Functional and geometric design and rural and urban roads of all classes; subgrade and pavement design; urban roads of all classes; techniques for access control; freeway interchange design and organization and financing. Prereq: 554 or graduate standing.

555 Public Transit Planning (3) Characteristics of transit modes—conventional and paratransit; operational design of transit services; route planning and scheduling; cost analysis; mode choice models; performance evaluation; optimization of transit management and financing. Prereq: 554 or graduate standing.

556 Traffic Accident Reconstruction (3) Data collection and analysis as basis for accident prevention on control programs; roadside hardware design and crash test. Prereq: 452 or graduate standing.

557 Transportation Planning and Operations with Micro-Computer Applications (3) Transportation system management techniques and application of microcomputers to analysis of transportation actions. Prereq: 551 and 556.

558 Planning and Transportation (3) Preparation of transportation as elements of comprehensive development plans. Analysis of relationship between various transportation modes and between transportation and other community features. Use of planning process to establish existing travel patterns, modeling of demand, proposing alternatives and evaluation. Prereq: Graduate standing. Same as Planning 537.

561 Finite Element Applications in Structural Engineering (3) Application of finite element method to typical problems in structural engineering. Truss, beam and plate elements; two-dimensional stress and strain; two-dimensional elements; representation of nonlinear material behavior with elastic and elastic-plastic models. Prereq: Structural Analysis and Matrix Computation or equivalent. Taught concurrently with CE 538. Students may not receive credit for both 538 and 561.

562 Structural Systems (3) Structural system analysis and design; dead, live, wind, and earthquake loads on buildings; vertical and horizontal resisting systems; use of computers in analysis and design. Prereq: Introduction to Structural Design.

563 Statically Indeterminate Structures (3) Elastic analysis of indeterminate articular and rigid frames with irregular prismatic members using energy, slope deflection, and moment distribution methods; plastic analysis of rigid frames; and stability analysis of compression members and portal frames. Prereq: Structural Analysis II.


571 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; research among results, and current specifications for design. Prereq: 471.
Environmental Engineering

GRADUATE COURSES

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

502 Registration for Use of Facilities (1-15) 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.

508 Seminar (1) Reports on current research in environmental engineering at UT. Prereq: Graduate standing.

510 Environmental Protection (3) Managing of water resources, wastewaters, air quality, solid wastes, and nuclear materials to promote efficiency and comfort and to safeguard balances in natural ecosystems. Prereq: Consent of instructor.

520 Open Channel Hydraulics (3) Open channel flow principles, properties, and classifications; uniform and gradually varied flow theories; open channel design; unsteady flow theory and analysis; dynamic routing; spatially varied flow; nonlinearTs; microcomputer applications, featuring HEC-2 model. Prereq: Hydrology.

522 Floodplain and Urban Flood Management (3) Review of national, regional, and local flood problems; state of the art flood damage reduction alternatives; structural and non-structural institutional responses; policies, programs, organizations, regulations, and legal aspects; floodplain hydrology and hydraulics; HEC-1, HEC-2; floodway encroachment, flood hazard zone and damage potential determinations; cast studies. Prereq: Hydraulics or consent of instructor for non-majors.

524 Sediment Transport (3) Sediment properties and measurements; principles of dynamics of suspended and bed sediment transport in erodible channels; erosion, transportation, and deposition of sediment by flowing water; erodible channel design; channel regime theory; common computer models. Prereq: Hydraulics.

525 Soil Erosion and Sediment Yield (3) Theory of soil erosion and sediment yield processes from disturbed land; methods and computer models for estimating sediment yield and sediment control theory and management practices. Local and state regulations. Prereq: Civil Engineering 395. (Same as Biosystems Engineering 525.)

530 Urban Hydrology and Stormwater Engineering (3) Planning, design, modeling, management, and maintenance of urban stormwater systems. Theory and application of hydraulic and hydrologic principles to design of stormwater management systems; design of inlet structures, conveyance systems, detention/retention basins and appurtenances, and selected best management practices (BMP’s); evaluation of land-use changes of runoff quantity and quality; review, selection and application of contemporary computer models. Prereq: Hydraulics, Hydrology.

535 Ground Water Hydrology (3) Dynamics of flow and contaminant transport in groundwaters; hydrodynamics, dispersion, anisotropy, layered soils, unsaturated flow and groundwater contaminant transport phenomena. Analytical and numerical solution of flow and transport equations. Prereq: Hydraulics and Hydrology or Civil Engineering 485 for geology majors. (Same as Geological Sciences 535.)

543 Instrumentation and Measurement (3) (Same as Biosystems Engineering 543.)

545 Monitoring Hydrologic Phenomena (3) (Same as Biosystems Engineering 545.)

551 Physicochemical Unit Processes (3) Theory and design application in water and wastewater treatment. Prereq: Water and Waste Treatment, 2 hrs and 1 lab. (Same as Biosystems Engineering 552.)

552 Biological Treatment Theory (3) Theory and design applications of biological processes to treatment of wastewater and solid wastes. Prereq: Water and Waste Treatment, 2 hrs and 1 lab. (Same as Biosystems Engineering 552.)

553 Aquatic Chemistry (3) Theoretical, applied and analytical chemistry related to generation, measurement and treatment of environmental contaminants. Prereq: General Chemistry. 2 hrs and 1 lab.

554 Environmental Engineering Chemistry (3) Application of chemical principles in analyzing physical, chemical, or biological interactions of chemical contaminants in various environmental compartments: atmosphere, hydrosphere, and lithosphere. Prereq: One year chemistry and consent of instructor.

555 Solid Waste Management (3) Magnitude and characteristics of solid waste problems; collection systems; design of disposal systems: landfill, incineration, and composting; design of waste recovery systems; current and future regulations. Prereq: Senior standing.

556 Hazardous Waste Management (3) Analysis and design of operations and processes for hazardous waste disposal and specific regulations. Prereq. Industrial applications. Prereq: Graduate standing or consent of instructor.

557 Hazardous Waste Site Remediation (3) Advanced study of processes for hazardous waste site remediation: soil vapor extraction, soil washing, chemical destruction, thermal destruction, bioremediation. Prereq: 556 or consent of instructor.

570 Air Quality Management/Pollution Control (3) Introductory course on concepts of air pollution, analysis of relationships among sources, meteorology, effects; stack sampling; emission control systems. Prereq: Consent of instructor.

571 Design of Air Pollution Control Systems (3) Design and evaluation of systems used to control emission of gaseous and particle air pollutants. Comprehensive design of specific devices and systems. Prereq: 570.

572 Air Quality Dispersion Modeling (3) Diffusion in atmosphere; application of atmospheric dispersion models and evaluation of meteorological and air quality data. Prereq: 570.

573 Sampling of Air Pollutants (3) Standard sampling methods for particulate and gaseous air pollutants and ambient air sampling from industrial processes; ambient air monitoring instrumentation/techniques. Prereq: 570.

575 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 575, Microbiology 575, and Biosystems Engineering 575.)

581 Industrial Pollution Prevention (3) (Same as Chemical Engineering 581 and Engineering Science 585.)

590 Special Problems in Environmental Engineering (1-6) Enrollment limited to environmental engineering students in non-thesis program. Prereq: Graduate standing. May be repeated. Maximum 6 hrs. S/N only.

595 Special Topics (1-4) Problems and topics related to current developments in field. May be repeated. May be repeated. Maximum 6 hrs. S/N only.

599 Problems and topics related to current developments in field. May be repeated. May be repeated. Maximum 6 hrs. S/N only.

620 Advanced Surface Water Hydraulics (3) Advanced topics in surface water hydraulics; solutions in St. Venant equations of unsteady flow for complex channel situations; dam breach modeling. Prereq: 520.

651 Industrial Waste Unit Operations and Processes (3) Theoretical design and laboratory modeling of industrial waste treatment processes and operations. Prereq: 551, 553. Prereq or coreq: 552. 2 hrs and 1 lab.

653 Pollutant Fate Modeling and Risk Assessment (3) Application of scientific principles concerning movement and fate of chemicals at interfaces of air, water, and earth's solid substrates in environment. Methods of assessing risk posed by presence of those chemicals. Prereq: 551.

691 Special Topics in Environmental Engineering (3) Selected advanced problems of current interest. Prereq: Consent of instructor. May be repeated.
Classics
(College of Arts and Sciences)

David W. Tandy, Head

Professors: Craig, C. P., Ph.D. .......... North Carolina
Geisel, G. C, Ph.D. ............... North Carolina
Martin, S. D., Ph.D. ...............Michigan
Tandy, D. W. (Distinguished Professor), Ph.D. ............... Yale

Associate Professor:
Shelton, J. E., Ph.D. ............... Vanderbilt

Assistant Professors:
Sutherland, E. H., Ph.D. .......... UC Berkeley
Van de Moortel, A., Ph.D. ......... Bryn Mawr

Emeriti Faculty:
Rutledge, H. C., Ph.D. ............... Ohio State

The graduate courses in the Classics include the wider reading of Greek and Latin authors in a selected field, a more detailed study of one of the great genres of classical literature, and the development of background for the appreciation of Greek or Roman life and literature.

GRADUATE COURSES


405-06 Selected Readings from Greek Literature (3,3) For advanced students in Greek, plays, historical writings, poetry of ancient Greece in original Greek. Prereq: 401-402 or consent of instructor. May be repeated. Maximum 9 hrs.

414 Cicero and Techniques of Latin Prose Composition (3) For advanced students in Latin, practice in prose composition, writings of Cicero the model. Prereq: 351-52 or consent of instructor.

431-32 Selected Readings from Latin Literature (3,3) For advanced students in Latin, oratory, historical writings, poetry of ancient Rome in original Latin. Prereq: 351-352 or consent of instructor. May be repeated. Maximum 9 hrs.

435 Medieval Latin (3) Selected readings from Latin prose and poetry of medieval Europe. Prereq: Consent of instructor.

441 Special Topics in Classical Civilization (3) Art, literature, religion, and society of Greece and Rome. May be repeated with consent of department. Maximum 9 hrs.

461 Studies in Classical Archaeology (3) Variable content course offering subject matter not taught in an existing course, or concentrating on one aspect of existing survey. Prereq: According to topic. May be repeated. Maximum 9 hrs.

561 Special Topics in Classical Civilization (1-3) Advanced tutorial work in Greek and Roman authors in English translation; problems in cultures of Greece and Rome. May be repeated. Maximum 9 hrs. Letter grade or S/NC.

562 Problems in Old World Archaeology (3) Selected topics and research problems in European, Asian and African prehistory. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Communication Studies
(College of Communication and Information)

MAJORS DEGREES

Communication ........................................ M.S., Ph.D.

John W. Haas, Head

Professors:
Julian, Faye D. (Liaison), Ph.D. .... Tennessee
Lester, Lorayne W., Ed.D. .......... Tennessee

Associate Professors:
Ambrester, M. L., Ph.D. ............... Ohio State
Cook, N. C., M.A. ......................... Alabama
Glenn, Robert W., Ph.D. .......... Northwestern
Haas, John W., Ph.D. ............... Kentucky

Assistant Professors:
Amler, R. S., Ph.D. ................... Ohio State
Halone, Kelby K., Ph.D. .......... Oklahoma
Violanti, Michelle T., Ph.D. ........ Kansas

Emeriti Faculty:
Yeomans, G. Allan, Ph.D. ...... Louisiana State

The School of Communication Studies offers a concentration area for the master’s degree with a major in Communication and participates in the interdisciplinary doctoral program. See Communication for additional information.

Graduate courses in Speech Communication also provide opportunities for students in a variety of disciplines to investigate how oral language can effect changes in the knowledge, the understanding, the ideas, the attitudes, or the behavior of other human beings.

Speech Communication

GRADUATE COURSES

466 Rhetoric of the Woman’s Rights Movement to 1930 (3) Historical and critical study of public address in campaigns for women’s rights in United States from 1830’s to 1930’s. (Same as Women’s Studies 466.)

476 Rhetoric of the Contemporary Feminist Movement (3) Historical and critical study of rhetoric in campaign for women’s rights in United States from 1940’s to present. (Same as Women’s Studies 476.)

505 Research Methods (3) Understanding of wide array of data collection and analysis procedures used in speech communication research. Development of project/thesis proposal.

510 Orientation to Teaching Assistantship (1) Curriculum, classroom management, and other issues associated with teaching at college level. For departmental GTAs.

525 Seminar in Interpersonal Health Communication (3) Current research in health communication: support groups, medical ethics, medical narratives, doctor-patient communication, or interpersonal communication theoretical perspectives in medicine.

550 Organizational Culture (3) Clarification of complex nature of organizational culture to communicate meaning and its usefulness to organizational effectiveness: challenges created by today’s changing organizations and workforces.

Communication
(College of Communication and Information)

MAJOR DEGREES

Communication ........................................ M.S., Ph.D.

The College of Communication and Information offers the Master of Science for the Schools of Advertising and Public Relations, Journalism and Electronic Media, Information Sciences, and Communication Studies. The Doctor of Philosophy in Communication is offered with concentrations in the areas noted above.

For application forms and other information about the M.S. and Ph.D. programs in Communication and Information, write to: Associate Dean for Graduate Studies, College of Communication and Information, 420 Communications Building, The University of Tennessee, Knoxville, Tennessee 37996-0347.

ADMISSION REQUIREMENTS

Applicants must meet admission requirements of the Graduate Council. In addition, they must complete the Graduate Record Examination, rating forms, and application forms as required by the College of Communication and Information. Minimum requirements for admission to full potential candidate status normally include a 3.0 (4.0 system) grade-point average in undergraduate studies and scores at or above the fiftieth percentile in verbal, quantitative and analytical aptitude on the Graduate Record Examination. All application materials are screened by an admissions committee authorized by the faculty of the College of Communication and Information.

New students normally are admitted to the programs at the beginning of fall semester. However, under special circumstances, a student may be admitted at the beginning of spring semester in a temporary non-degree status. Applications for fall admission must be received by May 1. Applications for financial aid are due by March 1.

A baccalaureate degree in communication, information sciences, or a related field is recommended. Admission is possible with...
other baccalaureate degrees. However, all applicants without the appropriate background are required to take up to 18 semester hours of prerequisite and corequisite courses as determined by the department in which the student is enrolled.

Master's students who have had no courses in their major area of concentration may expect to spend four or more full-time semesters in the program, including a media internship.

THE MASTER'S PROGRAM

The Master of Science with a major in Communication is intended for students who desire a career in the mass media and communication industry, with an emphasis on communication management and a deeper understanding of the communication process and social role of media. The program concentrations include advertising, electronic media, journalism, science communication, public relations, converging media, and science communication. Both thesis and non-thesis options are available.

Degree Requirements

The M.S. program emphasizes communication management and industry in the areas of advertising, electronic media, journalism, science communication, public relations, converging media, and speech communication. For the thesis option, a minimum of 30 hours of approved graduate work is required. The non-thesis option requires 33 hours. Orientation and attendance is required.

1. Six hours of core courses—Communication 512 and 540 to be taken during the first two semesters of the student's program, except with written approval of the Associate Dean for Graduate Studies for the College.
2. Fifteen hours within one department of the college, at least 6 hours at the 500 level or above. An internship, if needed, is included.
3. Three hours for the thesis option and 9 hours for the non-thesis option of electives from a list provided by the department in area of concentration.
4. Six hours of thesis work (Communication 500) or a 3-hour project (Communication 590).

Additional hours may be required for those who do not have academic prerequisites, and an internship may be required for those who do not have professional experience in the field they wish to study. A course in communication law is a prerequisite.

A student's internship experience requires approval by his/her advisor. Credit will be given through 598, Electronic Media 598, Journalism 598, or Public Relations 598 on the basis of 3 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the hour requirements for the M.S. program. Previous professional experience will be evaluated by the student's committee. Students interested in subsequent entry into a doctoral program are advised to pursue the thesis option and to take additional courses in communication theory and research, subject to advisor's approval.

After completion of the formal program of coursework and research for the thesis option, the student must pass an oral examination conducted by his/her graduate committee. The non-thesis option requires a written comprehensive examination and an oral defense of the project.

THE DOCTORAL PROGRAM

The Ph.D. with a major in Communication is intended to prepare scholars for teaching, research, administration, and service in the fields of communication and information. The program is interdisciplinary, consisting of a required core curriculum and recommended courses outside the College in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. New students may be admitted to the program at any time; however, core courses begin only in the fall semester. Orientation attendance is required.

The master's degree is required for entry into the doctoral program. Students lacking academic or professional experience in communications will be required to take prerequisite courses prior to enrollment, however, the program may be completed within three academic years of full-time study beyond the master's degree.

The following are normally minimal requirements for admission to full potential candidate status:
1. A 3.0 (4.0 system) grade-point average in undergraduate studies, and 3.5 for graduate work in a master's degree;
2. At or above the fiftieth percentile in verbal, quantitative and analytical aptitude on the Graduate Record Examination;
3. Endorsement by at least three former teachers or professional colleagues; and
4. A statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Ph.D. Admissions Committee are recommended and may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

A minimum of 87 hours of approved graduate work is required for the Ph.D.
1. Twenty-seven hours of core courses—Communication 622, 632, 642, 644; 6 hours of statistics; and of the following courses: Communication 622, 632, 642, and 652.
2. Fifteen hours in a primary concentration (outside of the College of Communication and Information).
3. Twelve hours in a secondary concentration (outside of the College of Communication and Information).
5. Twenty-four hours of dissertation. All courses require the approval of the student's advising committee. Admission to candidacy must be attained at least 24 hours prior to graduation and requires successful completion of a written comprehensive examination.

Each doctoral student's progress will be reviewed annually by the Doctoral Committee of the College of Communication and Information. Results will be reported to the student by his/her program advisor, who will convey the committee's recommendation concerning the student's remaining in the program (non-binding) and suggestions for improvement in performance.

Candidates without prior teaching experience must register for Communication 521, Tutorial in Communication Teaching. Planned course offerings in the College of Communication and Information for a full calendar year are available the preceding November. This information is available from the Graduate Studies Office, 420 Communications Building, 974-6651. See also courses listed under Advertising/Public Relations, Journalism/Electronic Media, Information Sciences, and Speech Communication.

ACADEMIC STANDARDS

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

GRADUATE COURSES

400 Mass Communication Law and Ethics (3) Legal issues directly affecting the mass media: libel, privacy, free press-fair trial, judicial controls, governmental regulations. Ethical standards and practices of mass media in America. Prereq: News Writing or Advertising Creative Strategy or Radio-TV News, Advertising and Promotion or History of Rhetorical Theory or consent of instructor. (Same as Legal Studies 400).
500 Thesis (1-15) P/NC only.
502 Registration for Use of Facilities (1-15) Required for the student not 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.
512 Mass Media Research Methods (3) Applications of communication research techniques for management. Gathering and analysis of data for assessing media audiences and message impacts. Prereq: Consent of instructor or admission to program.
521 Tutorial in Communication Teaching (1) Experience as teacher under guidance of faculty member. Prereq: Consent of instructor. S/NC only.
540 Communication Theory (3) Selected research hypotheses and theories in literature of mass communications. Prereq: Consent of instructor or admission to program.
550 Seminar in Media Economics and New Technology (3) Electronic and print media ownership, finance and corporate structure. Roles of new technologies and marketing techniques in changing media content and function in future. Prereq: Consent of instructor or admission to program.
551 Seminar in Science, Society, and the Mass Media (3) Investigation of interplay between scientific community and mass media: how scientific information reaches public and impact of journalism on scientific practice. Prereq: Consent of instructor.
Comparative and Experimental Medicine

(Office of the Provost)

MAJOR DEGREES

Comparative and Experimental Medicine .......... M.S., Ph.D.

Robert N. Moore, Director

Joint Graduate Coordinating Committee:

Bartges, Joe, D.V.M., Ph.D., Veterinary Teaching Hospital
Karlstad, M.D., Ph.D., Anesthesiology
Lawler, J. E., Ph.D., Psychology
Lozzio, C., M.D., Medical Biology
Moore, Robert (Division), Ph.D., Veterinary Teaching Hospital

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly-administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of experimental pathology, infectious diseases, pharmacokinetics, epidemiology, clinical medicine, immunopathology, hematology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, UT Medical Center at Knoxville, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilia Clinic, Developmental and Genetic Center, Hematology and Oncology services, and departments of life sciences.

For additional information, write to the Office of Research and Graduate Programs, or access the web site at http://www.vet.utk.edu/graduate.

ADMISSION REQUIREMENTS

Admission requirements of the Graduate Council of UT apply. In addition, all applicants must furnish three letters of recommendation from individuals who are familiar with their scholastic or professional records.

Master of Science Degree Program

Applicants must have a baccalaureate degree with coursework in chemistry through organic, mathematics through calculus, physics, and basic biology. More advanced study in biology such as biochemistry, mammalian anatomy, histology, cell biology, or other appropriate biomedical courses from an accredited university is recommended. Applicants for admission to the Master of Science degree program whose background include no formal training in the biomedical field beyond the baccalaureate degree will be required to score at least 1,000 on the quantitative and verbal portions of the Graduate Record Examination.

Doctor of Philosophy Degree Program

Applicants generally will be expected to have a professional degree in one of the medical sciences (e.g., M.D., D.D.S., DVM) or a master's degree in one of the biomedical sciences and a Graduate Record Examination score of at least 1000 for the quantitative and verbal sections.

An individual having a baccalaureate degree with a strong background in the physical and biological sciences may be admitted upon presenting evidence of exemplary performance on the Graduate Record Examination. Exceptional veterinary students at UT may be admitted to the Comparative and Experimental Medicine graduate program but will be enrolled officially as veterinary students. During summers such students may take advantage of registering for graduate courses to be counted as elective courses in the veterinary program.

THE MASTER'S PROGRAM

Core courses are required for the program. A basic science and/or applied science concentration must be selected at the first meeting of the student's master's committee. For the basic science concentration, students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 6 credit hours of 500-level biochemistry or cell biology. See listings under the Biochemistry and Cellular and Molecular Biology program for information on these courses. For the applied science concentration, students must take at least 6 credit hours of 600-level epidemiology and at least 5 credit hours of 500- or 600-level statistics. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline, 5 or more hours of electives, and 6 hours of Theses 500. Exceptions to accommodate students with specific interests must be approved by the Joint Graduate Coordinating Committee after application, in writing, to the director.

The graduate committee (at least 3 members) is chosen after the first term and must include at least one member from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine. If a minor is declared, one member must be from the minor discipline. A final oral examination is given at the end of the program.

THE DOCTORAL PROGRAM

Core courses are required for the program. A basic science and/or applied science concentration must be selected at the first meeting of the student's doctoral committee. For the basic science concentration, students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 6 credit hours of 500-level biochemistry or cell biology. See listings under the Biochemistry and Cellular and Molecular Biology program for information on these courses. For the applied science concentration, students must take at least 6 credit hours of 600-level epidemiology and at least 5 credit hours of 500- or 600-level statistics. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline, 5 or more hours of electives, and 6 hours of Theses 500. Exceptions to accommodate students with specific interests must be approved by the Joint Graduate Coordinating Committee after application, in writing, to the director.

The graduate committee (at least 3 members) is chosen after the first term and must include at least one member from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine. If a minor is declared, one member must be from the minor discipline. A final oral examination is given at the end of the program.
hours in 500- or 600-level courses in basic mechanisms of disease and at least 6 credit hours of 500-level biochemistry or cell biology. See listings under the Biochemistry and Cellular and Molecular Biology program for information on these courses. For the applied science concentration, students must take at least 6 credit hours of 800-level epidemiology and at least 5 credit hours of 500- or 600-level statistics. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline. Exceptions to accommodate students with specific interests must be approved by the Joint Graduate Coordinating Committee after application, in writing, to the director. Areas of emphasis may include hematology, oncology, comparative pathology, comparative pharmacology, toxicology, immunology, genetics, infectious disease or biochemistry of diseases. At least 24 hours of coursework, including a minimum of 6 hours at the 600 level, and 24 hours of Dissertation 600 are required for a total of 48 hours. For students with professional degrees, a minimum of 18 hours of coursework beyond the professional degree is required for a total of 42 hours.

The doctoral committee (at least 4 members) is chosen during the first year. Three of the four members, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine.

A comprehensive examination is given at the completion of coursework. A seminar and final oral defense of the dissertation culminate the program.

### Comparative and Experimental Medicine—Veterinary Medicine

#### GRADUATE COURSES

Participating departments include: Animal Science, Comparative Medicine, Microbiology, Pathology, Large Animal Clinical Sciences and Small Animal Clinical Sciences. Several faculty in the Department of Microbiology hold joint appointments in the College of Veterinary Medicine. See Microbiology under Fields of Instruction for additional courses.

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

#### 501 Special Topics in Comparative and Experimental Medicine (1-6) Specialized experience in comparative and experimental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

#### 502 Registration for Use of Facilities (1-15) 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 Predictive Toxicology (3) Principles and techniques of predictive toxicology and bioassay activity including animal models, expert systems, neural nets and molecular similarity.

#### 505 Laboratory Animal Care and Use (2) Review of basic laboratory animal care and use as prerequisite to conducting research using animal subjects. Compliance issues and techniques.

#### 506 Experimental Animal Surgery (3) Competence in performing humane surgical modifications of experimental animals. Techniques of anesthesia. Drug administration and postoperative care. Prereq: Embryology, physiology, pathology and/or consent of instructor. 1 hr and 2 labs.

#### 530 Wildlife Diseases (2) (Same as Wildlife and Fisheries Science 530.)

#### 551 Mammalian Organology (3) (Same as Animal Science 551.)

#### 552 Anatomy of Domestic Carnivores (4) (Same as Animal Science 552.)

#### 561 Pharmacology (4) Principles of pharmacokinetics and pharmaco-dynamics properties of drugs: mode of action, pharmacologic effects, chemical and physical properties, metabolism, toxicities, important idiosyncracies and clinical applications. Prereq: Consent of instructor.

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

#### 610 Advanced Topics in Medical Science (1-3) New developments in biological research applicable to clinical medicine. Prereq: Doctoral candidate in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

THE MASTER’S PROGRAM

Two semesters of calculus plus two additional semesters of college mathematics (e.g., linear algebra, differential equations, probability) and a course in discrete structures and in systems programming are required for admission. For the master’s degree, 30 semester hours of graduate credits are required, of which must be 500 level or above. Computer Science 530, 560 and 580 are required for the degree. Graduate courses taken outside the department are sometimes allowed but must be approved by the Graduate Committee before enrollment.

Thesis Option

The student must reach agreement on a thesis topic with a faculty advisor and must take 6 hours of 500 Thesis. Six hours of 500 Thesis may count in the 24-hour requirement at the 500 level or above.

Non-Thesis Option

The student must take coursework in an area to prepare for the non-thesis master’s examination. The student’s advisor must verify that an acceptable set of courses has been taken before the student may schedule the examination. Information concerning the examination is available in the departmental office.

Problems in Lieu of Thesis Option

The student must reach agreement on the problem topic with a faculty advisor and pass an oral exam on the problems before a committee of three or more faculty members, at least two of whom must be Computer Science faculty.

Master’s Minor in Computer Science

The graduate minor consists of any two of the three core courses (530, 560, 580) plus an additional 3 hours of graded computer science graduate-level courses at or above the 400 level.

THE DOCTORAL PROGRAM

A student seeking admission to the Ph.D. program is expected to meet the following requirements:

1. The student should have three letters of recommendation sent directly to the department head from individuals capable of assessing the student’s potential for advanced work in computer science (for example, college teachers or employers for whom the student has worked after earning a Bachelor’s degree). The department reserves the right to contact these individuals or others knowledgeable people if additional information deemed necessary or desirable.

2. The student is expected to have taken the GRE verbal and quantitative general test within the past three years and to have these scores sent to the Office of Graduate Admissions.

3. The student should satisfy the same background requirements as for the master’s program. See the departmental brochure for details.

Original research reported in a dissertation of high quality is emphasized. The minimum hour requirements are 24 hours of course 600 Doctoral Research and Dissertation and 48 hours of graduate courses beyond the equivalent of a master’s degree (i.e., beyond 30 graduate credit hours) graded A-F. Computer Science 530, 560 and 580 are required for the degree. At least six hours of 600-level graded courses must be taken in computer science at UT. The student’s advisor and committee will establish the specific course requirements. The comprehensive examination consists of a departmental written examination and a subsequent oral examination conducted by the student’s committee.

GRADUATE COURSES

420 Advanced Topics in Machine Intelligence (3)

Search, learning, expert systems, neural networks, pattern recognition and natural language processing. Faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

430 Advanced Topics in Hardware Systems (3)

Architecture, parallel processors, microprogramming, networks and communications. Faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

460 Advanced Topics in Software Systems (3)

Operating systems, compilers, parallel computation, software engineering, database systems and programming languages. Faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

480 Advanced Topics in Theoretical Computer Science (3)

Theory of computation, complexity theory, formal languages and graph theory and its applications. Faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

494 Special Topics in Computer Science (1-3) May be repeated. Maximum 9 hrs.

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

502 Registration for Use of Facilities (1-15) Required for students 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.

522 Cybernetics (3)

Various functions in living systems and their actual or potential realization in computers. Prereq: Discrete Structures.

525 Software Engineering (3)

Survey of key ideas in software engineering; formal methods, tools, testing, reliability, structured design and development, metrics, management and history of the field.

530 Computer Systems Organization (3)

Architectures and systems organization for serial and parallel machines. Required background: Architecture or machine organization.

532 Boolean Algebra, Logic Design and Microprocessors (3)


536 Theoretical Aspects of Computer-Aided Design (3)

Algorithms for CAD of VLSI systems. Placement and routing algorithms; programmable logic arrays. Prereq: Discrete structures and analysis of algorithms.

538 Computer Networks (3)


541 Database Management Systems (3)

Data model theory, optimization, and normalization; intelligent data; database systems; comparison of implementations; analysis of distributed and networked databases. Techniques for evaluation of performance, integrity, security and reliability. Prereq: Discrete Structures.

551 Pattern Analysis (3)

Decision-theoretic and structural pattern analysis. Deterministic and statistical decision rules, feature extraction and representation; syntactic and semantic methods, relational models. Prereq: Discrete Structures and probability or statistics.

552 Image Analysis (3)


560 Software Systems (3)

Design and implementation of compilers, software systems; optimization, run-time storage administration. Software system design issues; description, structure and design of contemporary software systems. Prereq: Systems Programming.

571-72 Numerical Mathematics (3) (Same as Mathematics 571-72.)

573 Finite Difference Methods for Partial Differential Equations (3) (Same as Mathematics 573.)

574 Finite Element Methods (3) (Same as Mathematics 574.)

575 Matrix Theory and Techniques in Numerical Analysis (3) (Same as Mathematics 575.)

576 Sparse Matrix Computations (3)

Solution of large sparse linear systems; graph models, reordering techniques, symbolic factorizations, data structures, numerical algorithms, complexity analyses, parallel algorithms. Prereq: Numerical linear algebra.

580 Foundations (3)

Foundations of computer science, including computability, computational complexity, fundamental algorithms and algorithm analysis. Required background: Automata theory.

581 Advanced Design and Analysis of Algorithms (3)

Analysis of algorithms and relevance of design to efficient computer algorithms. Sorting, searching, graph algorithms, pattern matching, dynamic programming, efficient approximation algorithms. Prereq: 580.

593 Independent Study (1-15) May be repeated. S/NC only.

594 Special Topics in Computer Science (1-3) May be repeated.

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

620 Advanced Topics in Intelligent Systems (1-6) Prereq: Consent of instructor. May be repeated with consent of department.
Consumer Services Management

(College of Education, Health, and Human Sciences)

MAJORS DEGREES
Consumer Services Management ............ M.S.
Human Ecology ................................. Ph.D.

Nancy B. Fair, Head

Professors:
Costello, Carol, Ph.D. (Liaison) .......... Tennessee
Fair, Nancy B., Ph.D. ......................... NC State
Fairhurst, Ann E., Ph.D. ................. Tennessee
Ph.D. (Liaison) .............................. Oklahoma State
Jolly, Laura, Ph.D. .......................... Oklahoma State

Associate Professors:
Wise, Dena, Ph.D. .......................... Texas A&M

Assistant Professors:
Chen, Rachel, Ph.D. ........................... Tennese
Pfaffenberg, Carl, Ph.D. ....................... Tennessee
Salazar, John, Ph.D. .......................... Auburn
Young, Allison, Ph.D. ........................ Minnesota

The Department of Consumer Services Management offers graduate programs leading to degrees, majors, and concentrations in:

Master of Science
Consumer Services Management
Retail and Consumer Sciences
Hospitality and Tourism
Management

Doctor of Philosophy
Human Ecology
Retail and Consumer Sciences
Hospitality and Tourism
Management

Certificate Programs
Services Management
Tourism Development

The Department of Consumer Services Management offers the master’s degree with a major in Consumer Services Management and concentrations in hospitality and tourism management and retail and consumer sciences.

The programs in Consumer Services Management prepare students for careers in industry and business, public and private agencies, and educational institutions. Master’s level work develops students’ technical skills in retail management, merchandising, hospitality management, tourism, and related consumer services.

The advanced work undertaken for the doctoral degree focuses on building and applying research skills to advance the fields of retail and consumer sciences and hospitality and tourism.

Interested students should contact the department for more information or visit the department link on the college web site: http://www.cehhs.utk.edu/departments.html.

Admission Requirements
A complete file for review includes the Graduate Application for Admission file, Department of Consumer Services Management application, Graduate Record Examination (GRE) scores for the general section, and three Graduate Rating Forms completed by individuals who can attest to the potential for graduate education. In addition to specified entrance requirements stipulated by the Graduate Council, admission to the master’s degree program with a major in Consumer Services Management is dependent on completion of undergraduate courses that give the necessary background for success in the graduate program. For the concentration in retail and consumer sciences, students should have an adequate background in retailing and/or consumer science supported by coursework in marketing and statistics. For the concentration in hospitality and tourism management, students should have an adequate background in hotel and/or restaurant management and/or tourism management supported by coursework in food production, cost control, or lodging management. Superior students deficient in one or more of the above requirements, may be admitted at the discretion of the department’s graduate faculty. Deficiencies may need to be addressed through undergraduate coursework.

THE MASTER’S PROGRAM
The requirements for the major in Consumer Services Management are listed below by concentration.

Retail and Consumer Sciences (Thesis)

Services Management:
Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532

Research Methods:
Retail and Consumer Sciences 562 3
Statistical Methods 6
Cognate Area 6
RCS Elective 3
Thesis 6
TOTAL 36

Hospitality and Tourism Management (Thesis)

Services Management:
Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532

Tourism:
Select either HRA 523 or 524 3
Research Methods:
Retail and Consumer Sciences 562 3
Statistical Methods 6
Cognate Area 6
HRA 547, Field Experience 3
Thesis 6
TOTAL 39

Hospitality and Tourism Management (Non-Thesis)

Services Management:
Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532

Tourism:
Select from HRA 523, Tourism Analysis; 423, Marketing for Hospitality and Tourism; 435, Conventions and Meetings: Pursuit and Attainment; 524, Tourism Destination Development 6
Research Methods:
Retail and Consumer Sciences 562 3
Statistical Methods 3
Cognate Area 6
HRA 547, Field Experience 3
Professional Paper/Project: RCS 501 3
TOTAL 36

THE PH.D. CONCENTRATIONS
The requirements for the doctoral degree are listed below by concentration.

Retail and Consumer Sciences

RCS Required Courses:
RCS 590, 616 12
Research Methods:
RCS 590, 616 5
Statistics:
Stat 537, 538, 579, elective 12
Cognate Area1 9
Instructional Methods2 3
Electives 21
Dissertation 24
TOTAL 86

1Cognate hours must include at least 3 hours at the 600 level.
2Graduate level courses that will help develop students’ instructional capabilities.

Hospitality and Tourism Management

HRA Required Courses:
HRA 614, 615, 547, 523, 524 15
Research Methods:
HRA 537, RCS 616 5
Statistics:
Stat 537, 538, 579 9
Cognate Area1 9
Instructional Methods2 3
Electives 21
Dissertation 24
TOTAL 86

1Cognate hours must include at least 3 hours at the 600 level.
2Graduate level courses that will help develop students’ instructional capabilities.
CERTIFICATE IN SERVICES MANAGEMENT

The Department of Consumer Services Management offers a certificate program in services management for students seeking continuing education and career advancement opportunities in the services industry. The 12-credit hour certificate is available by completing the following courses: Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532.

CERTIFICATE IN TOURISM DEVELOPMENT

The Department of Consumer Services Management offers a certificate program in tourism development for students seeking continuing education and career advancement opportunities related to tourism in public and private sectors. The 12-credit hour certificate is available by completing the following courses: HRA 523, Tourism Analysis, HRA 524, Tourism Destination Development, HRA 435, Conventions and Meetings: Pursuit and Attainment, HRA 423, Marketing for Tourism and Hospitality.

ACADEMIC STANDARDS

1. Evaluation of student progress will normally occur prior to enrollment for thesis hours (or the non-thesis option) and during the second semester of full time enrollment in the program. The review of the student will be undertaken by the faculty with consideration given to factors such as: GPA (minimum 3.0), portfolio evaluation, and demonstrated research capability.

2. If progress or performance is deemed insufficient, the faculty may recommend probation with specific goals set for a specified time or termination.

Hotel and Restaurant Administration

GRADUATE COURSES

423 Marketing for Hospitality and Tourism (3) Marketing principles and practices specifically applied to the hospitality and tourism industry. Includes the analyses of various hospitality and tourism marketing strategies and the implications of those strategies. Develops the use of marketing tools as an integral part of the hospitality and tourism operation.

435 Conventions and Meetings: Pursuit and Attainment (3) Discussion of types of conventions/ meetings, roles of meeting planners, identifying decision makers, site selection, negotiating, budgeting, marketing and gaining commitment from group. Prereq: HRA 210, 211, 390 or consent of instructor.

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

502 Registration for Use of Facilities (1-15) 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.

510 Trends and Issues in Services Management (3) Examination of current and emerging trends and issues in the consumer product and services industry. Implications of trends and their managerial and strategic applications in services management. (Same as Recreation and Leisure Studies 510.)

523 Tourism Analysis (3) Trade theory and regional analysis methodologies applied to tourism and the service industry, including travel balance account, interregional transactions flow, economic impacts, environmental economics, demand theory and forecasting.

524 Tourism Destination Development (3) Relationship of economic theory and planning principles to tourism development. Includes the application of prefeasibility analysis to tourism projects and the evaluation of various types of tourism and components of tourism.

532 Human Resource Management in Services Industry (3) Analysis of significant organizational processes and practices in management of human resources within consumer product and service industry.

534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture discussion format. Contemporary developments and trends in industry. Prereq: Consent of instructor. May be repeated.

535 Directed Study in Foodservice and Lodging Administration (1-3) Problems selected for study by student with approval of instructor. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

537 Seminar in Foodservice and Lodging Administration (1) May be repeated. S/NC only.

542 Advanced Hotel Administration (3) Strategic management of hotel organizations. Theoretical and applied literature on formulation and implementation of strategy: external and internal factors relevant for business and corporate level decisions. Consideration of role of marketing in hotel firms. Analysis of industry and case studies. Prereq: 531, 532.

547 Field Experience (3-9) Experience in food- or lodging-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. S/NC only.

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

Retail and Consumer Sciences

GRADUATE COURSES


412 Direct Retail Methods (3) Use of direct selling methods to sell goods and services. Analysis of consumer and product/service types for integrated direct retail methods. Direct mail, catalogs, telemarketing, infomercials, and electronic commerce (internet). Prereq: 376 Strategies for Growth.

415 Retail Promotion (3) In-store promotional activities; development of retail promotion strategies; evaluation of retail promotions; supplementary focus on forecasting. Prereq: 376 Strategies for Growth. Prereq: 376 Strategies for Growth.

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

501 Professional Project (3-6) Application-oriented, capstone project to show competence in major academic area. Enrollment limited to retail and consumer sciences students in non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

502 Registration for Use of Facilities (1-15) 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.

510 Retail Strategy and Decision Making (3) Strategic, strategic management and strategic process in retail sector. Analytical decision-making skills in retail, retail industry structure, international differences in retail systems. Prereq: Retail Management or equivalent.


538 Consumer Product and Service Development (3) Critical analysis of consumer product and service development process in services industry. Strategies for developing consumer products, services, programs, and service processes from conception to implementation and evaluation.

541 Consumer Analysis in Services Management (3) Analysis of consumer behavior in consumer products and services industry. Development of knowledge to positively impact services marketing organizations through marketing, environmental and product/services strategies based upon consumer behavior knowledge. Investigations of qualitative and quantitative methodologies to conduct elementary consumer facility research.

562 Research Methods (3) Fundamentals of science method, advancement of science, methodology and method of research. Issues and concepts of basic and applied research. Prereq: Statistics 531 or equivalent.

590 Research Seminar (1) Research topics in retail and consumer sciences. May be repeated. S/NC only.

593 Directed Study (1-3) Individual problems in retail and consumer sciences. Prereq: 9 hrs retailing and consumer sciences graduate coursework. May be repeated. Maximum 9 hrs.

595 Special Topics in Retail and Consumer Sciences (1-3) Lecture, group discussion on specialized topics: retail industry structure, international trade, international retailing, consumer affairs, entrepreneurship, small business management, issues in retail management, issues in retail strategy, quality perception by consumers, product and service value, retailing to children, retailing and special populations, special research methods. Prereq: 9 hrs graduate coursework. May be repeated. Maximum 9 hrs.

600 Dissertation (3-15) P/NP only.

614 Theory in Retail Environment (3) Analysis and evaluation of theory in retail environment and its application to research in retailing. Prereq: 562 or equivalent.

615 Retail and Consumer Sciences Literature and Thought (3) Evaluation of retail and consumer sciences literature with emphasis upon research literature, development of scholarly thought, and identification of potential areas of further study. Prereq: 562 or equivalent.

616 Research Methods, Models and Measurement in Retail and Consumer Sciences (3) Quantitative and qualitative methods and analytical concepts in the research process. Formulation of models and measurement of consumer sciences constructs. Prereq: 562, Statistics 538 or equivalent.

625 Strategic Managerial Retailing (3) Decision-making orientation that integrates strategic thinking with components with preparation and analysis of specific retail case situations. Prereq: 510 or equivalent.

641 Retail Consumer Behavior (3) Theories and concepts from social science in relation to ultimate consumer’s behavior. Prereq: 541 or equivalent.

695 Advanced Topics in Retail and Consumer Sciences (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance to retail and consumer sciences. Prereq: 9 graduate hours in consumer sciences. May be repeated. Maximum 9 hrs.
Earth and Planetary Sciences

(College of Arts and Sciences)

MAJOR DEGREES

Geology ........................................ M.S., Ph.D.

Claudia I. Mora, Acting Head

Professors:
Broadhead, Thomas W., Ph.D. .......... Iowa
Driese, Steven G. (Liaison), Ph.D. .... Wisconsin
Dunne, William M., Ph.D. ............. Bristol
Hatcher, Robert D., Jr. (Distinguished
Scientist), Ph.D. .......................... Tennessee
Labotka, Theodore C., Ph.D. ............ Caltech
McKinney, Michael L., Ph.D. .......... Yale
McSween, Harry Y. (Distinguished Professor),
Ph.D. ........................................ Harvard
Misra, Kula C., Ph.D. .............. Western Ontario
Mora, Claudia I. (Carden Professor),
Ph.D. ........................................ Wisconsin
Taylor, Lawrence A., Ph.D. .......... Lehigh

Associate Professors:
Clark, G. Michael, Ph.D. ............. Penn State
McKay, Larry D. (Jones Professor),
Ph.D. ........................................ Waterloo
Williams, Richard T. II., Ph.D. .... Virginia Tech

Assistant Professors:
Kah, Linda C., Ph.D. ...................... Harvard
Perfect, Edmund, Ph.D. ............... Cornell
Uhle, Maria (Jones Professor),
Ph.D. ........................................ Virginia

The Department of Earth and Planetary 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.

Prerequisite for both degrees is a bachelor’s degree, including coursework in mineralogy, optical mineralogy, petrology, stratigraphy, paleontology, structural geology, and field geology. One year each of coursework in calculus and chemistry and one year of coursework in biology, physics, or statistics are also required. Applicants lacking any of these may be admitted, but the deficiencies must be removed within the first year without graduate credit. 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 three of the following five groups:
   Group 1: 410, 460, 475, 480, 530, 563, 565, 568.
   Group 5: Any 400- or 500-level courses with graduate credit from related departments in sciences, mathematics, and engineering, selected with approval of the 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 24 hours of graded coursework with at least one course from any three of the groups listed in #3 above. 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. 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 encouraged.

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. This 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.

Geology

GRADUATE COURSES

401 Quantitative Methods in Geology (3) Applica-
411 Optical Mineralogy (2) Laboratory course on
412 Elements of X-ray Diffraction (2) Laboratory
420 Paleocology (4) Principles of ecological ana-
421 Invertebrate Paleontology (4) Survey of inver-
430 Process Geomorphology (3) Integrative ap-
440 Field Geology (5) Summer field course for ad-
450 Basic Environmental Geology (3) Applications
d 455 Principles of Geochemistry (4) Applications
d 460 Principles of Geophysics (3) Principles of
d 470 Applied Geophysics (3) Basic principles of geo-
d 475 Physical and Chemical Systems of the Earth
480 Principles of Economic Geology (4) Survey of
d 485 Principles of Hydrogeology (3) Physical prin-
d 486 Hydrogeology Laboratory (1) Application
500 Thesis (1-5) P/NP only.

Earth and Planetary Sciences

(College of Arts and Sciences)

MAJOR DEGREES

Geology ........................................ M.S., Ph.D.

Claudia I. Mora, Acting Head

Professors:
Broadhead, Thomas W., Ph.D. .......... Iowa
Driese, Steven G. (Liaison), Ph.D. .... Wisconsin
Dunne, William M., Ph.D. ............. Bristol
Hatcher, Robert D., Jr. (Distinguished
Scientist), Ph.D. .......................... Tennessee
Labotka, Theodore C., Ph.D. ............ Caltech
McKinney, Michael L., Ph.D. .......... Yale
McSween, Harry Y. (Distinguished Professor),
Ph.D. ........................................ Harvard
Misra, Kula C., Ph.D. .............. Western Ontario
Mora, Claudia I. (Carden Professor),
Ph.D. ........................................ Wisconsin
Taylor, Lawrence A., Ph.D. .......... Lehigh

Associate Professors:
Clark, G. Michael, Ph.D. ............. Penn State
McKay, Larry D. (Jones Professor),
Ph.D. ........................................ Waterloo
Williams, Richard T. II., Ph.D. .... Virginia Tech

Assistant Professors:
Kah, Linda C., Ph.D. ...................... Harvard
Perfect, Edmund, Ph.D. ............... Cornell
Uhle, Maria (Jones Professor),
Ph.D. ........................................ Virginia

The Department of Earth and Planetary 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.

Prerequisite for both degrees is a bachelor’s degree, including coursework in mineralogy, optical mineralogy, petrology, stratigraphy, paleontology, structural geology, and field geology. One year each of coursework in calculus and chemistry and one year of coursework in biology, physics, or statistics are also required. Applicants lacking any of these may be admitted, but the deficiencies must be removed within the first year without graduate credit. 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 three of the following five groups:
   Group 1: 410, 460, 475, 480, 530, 563, 565, 568.
   Group 5: Any 400- or 500-level courses with graduate credit from related departments in sciences, mathematics, and engineering, selected with approval of the 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 24 hours of graded coursework with at least one course from any three of the groups listed in #3 above. 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. 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 encouraged.

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. This 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.

Geology

GRADUATE COURSES

401 Quantitative Methods in Geology (3) Applica-
411 Optical Mineralogy (2) Laboratory course on
412 Elements of X-ray Diffraction (2) Laboratory
420 Paleocology (4) Principles of ecological ana-
421 Invertebrate Paleontology (4) Survey of inver-
430 Process Geomorphology (3) Integrative ap-
440 Field Geology (5) Summer field course for ad-
450 Basic Environmental Geology (3) Applications
d 455 Principles of Geochemistry (4) Applications
d 460 Principles of Geophysics (3) Principles of
d 470 Applied Geophysics (3) Basic principles of geo-
d 475 Physical and Chemical Systems of the Earth
480 Principles of Economic Geology (4) Survey of
d 485 Principles of Hydrogeology (3) Physical prin-
d 486 Hydrogeology Laboratory (1) Application
500 Thesis (1-5) P/NP only.
and must be passed before the student is admitted to candidacy; (2) complete course requirements as determined by the department and the student’s faculty dissertation research committee; and (3) satisfactorily complete and defend a research thesis.

THE MASTER’S PROGRAMS

In addition to general requirements of the Graduate Council, aspirants for the Master of Science degree must: (1) during the first semester in residence, take a prescriptive diagnostic examination covering major concepts in ecology and evolutionary biology. The examination may be taken twice and must be passed before the student is admitted to candidacy; (2) complete course requirements as determined by the department and the student’s faculty dissertation research committee; (3) pass a written and oral comprehensive examination designed to test for adequate knowledge in those areas essential to the student’s research program; and (4) satisfactorily complete and defend a dissertation. The department does not require a reading knowledge of a foreign language, but this may be imposed by the student’s faculty dissertation research committee. If so, the student has the option of demonstrating reading knowledge of the prescribed language by either (a) passing the official reading examination given by the language department or (b) earning a grade of at least a B in the second semester of a special language reading course for graduate students.

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

411-12 Minicourse in Ecology and Evolutionary Biology (2) Selected advanced topics in ecology, behavior, and evolutionary biology, concentrated in time and subject matter. Consult department listing for topics offered. Prereq: As announced. May be repeated. Maximum 4 hrs may apply toward department major.

419 Science as Method (3) Dynamic process of scientific discovery. Comparisons of science, nonscience, pseudoscience, successful and unsuccessful science. Ethics of scientific research, philosophical aspects of scientific enterprise, and implications for teaching and writing about science. Prereq: Introductory science or philosophy course, or consent of instructor. (Same as Botany 419 and Philosophy 419.)

431 Plant Ecology (4) (Same as Botany 431.)

446 Introduction to Oceanography (4) Basic oceanography: physical, chemical, geological and biological processes and patterns. Oceanic systems: upwellings, polar oceans, hydrothermal vents, gyres, coral reefs, estuaries, and coastal regions. Field trip to coastal required. Prereq: General Biology and General Chemistry; General Ecology recommended.

450 Comparative Animal Behavior (3) Principles and methods of studying behavior at all levels: physiological and evolutionary aspects. (Same as Psychology 450.)

459 Comparative Animal Behavior Laboratory (3) Introduction to observational and experimental research in ethology. Coreq: 450. (Same as Psychology 459.)


466 Special Topics in Organismal Biology (3) Evolution, ecology, biogeography, classification, and anatomy of selected animal and plant taxa. Prereq: General Ecology or consent of instructor.

470 Aquatic Ecology (3) Introduction to the physicochemical nature of inland waters with description of biotic communities and their interrelationships. Prereq: Chemistry 120-130 General Chemistry, Biology 250 General Ecology. 2 hrs and 1 lab.


484 Conservation Biology (3) Application of principles and techniques of ecological research to conservation of biological diversity at genetic, population, community, and ecosystem levels. Prereq: Biology 240 General Genetics, 250 General Ecology.

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

502 Registration for Use of Facilities (1-15) 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 Ecology and Evolutionary Biology Seminar (1) Advanced topics in ecology, behavior, and evolutionary biology. Senior departmental majors encouraged. Required of all first- and second-year graduate students. May be repeated. Maximum 4 hrs. S/NC only.

504 Special Topics (1-3) Selected directed readings or special course in topics of current interest. Consult department listing for offerings. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only.

508 Introduction to Faculty Research (1) Orientation of new graduate students to current research of departmental graduate faculty. Prereq: Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. S/NC only.

509 Foundations: Readings in Ecology (1-2) Readings and discussion of classic papers in field.

511 Foundations: Readings in Evolution (1-2) Readings and discussion of classic papers in field.

512 Foundations: Readings in Conservation Biology (2) Readings and discussion of classic papers in field.

514 Foundations: Readings in Mathematical and Computational Ecology (2) Readings and discussion of classic papers in field.

515 Foundations: Readings in Environmental Toxicology (1-2) Readings and discussion of classic papers in field.

516 Colloquium in Ethology (1) (Same as Psycholgy 516.)

520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering. Not intended for graduate students in Ecology and Evolutionary Biology.

524 Physiological Ecology of Animals (3) Adaptive physiological response of animals to natural changes in or extremes of physical and biotic environment. Terrestrial vertebrates. Prereq: Undergraduate courses in animal physiology and ecology, Biochemistry and Cellular and Molecular Biology 440 and General Ecology or equivalent.

535 Ecology and Development in the Amazon (3) Natural history, ecosystem diversity and function, and opportunities for sustainable economic development in the Amazon Basin. Includes field trip of 7-10 days to Manaus, Brazil.

540 Insect Taxonomy I: Major Orders (3) Survey of classification of major orders of insects, with practical experience in identification of insects at family level. Prereq: Consent of instructor. 4 hrs combined lecture and lab.

541 Insect Taxonomy II: Minor Orders (3) Survey of classification of minor orders of insects, with practical experience in identification of insects at family level. Prereq: 540 or consent of instructor. 4 hrs combined lecture and lab.

542 Insect Structure and Function (3) Integrated study of morphology and physiology at tissue and cellular level of insects. Prereq: Consent of instructor.

543 Aquatic Insects (3) Taxonomy and biology of aquatic insects; immature forms. Prereq: Consent of instructor. 2 hrs and 1 lab.

544 Fresh Water Invertebrate Zoology (3) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Prereq: Comparative Invertebrate Biology or equivalent and consent of instructor. 3 hrs lab and field study.

545 Advanced Animal Behavior (3) Second-level course in ethology, stressing evolution, genetics, physiology, ecology and human behavior. Prereq: 450 or equivalent. (Same as Psychology 545.)

546 Ethological Psychology (3) (Same as Psychology 546.)
603 Advanced Topics in Evolutionary Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in evolutionary biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

610 Advanced Topics in Mathematical, Theoretical and Computational Ecology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in mathematical, theoretical, and computational ecology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

611 Advanced Topics in Organismal Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in organismal biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

612 Advanced Topics in Environmental Toxicology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in environmental toxicology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

635 Environmental Assessment and Sustainable Development in Third World Countries (3) Concepts and methods of environmental impact assessment and risk assessment. Sustainable development concepts and issues in developing countries. The role of risk and impact assessment in achieving sustainable development. (Same as Botany 583.)

681-682 Advanced Mathematical Ecology (3,3) (Same as Mathematics 681-682.)

Economics

(College of Business Administration)

http://econ.bus.utk.edu

MAJORS DEGREES

Economics ........................................ M.A., Ph.D.  

Robert A. Bohm,  Head

Professors:  

Bohm, Robert A.,  Ph.D. .......... Washington (St. Louis)  

Chang, Hui S.,  Ph.D. .......... Vanderbilt  

Clark, Don P.,  Ph.D. .......... Michigan State  

Fox, William F.,  Ph.D. .......... Ohio State  

Hertzog, Henry W.,  Ph.D. .......... Maryland  

McKee, Michael,  Ph.D. .......... Carleton (Canada)  

Murray, M. N.,  Ph.D. (Liaison) .......... Syracuse

Associate Professor:  

Gauger, Jean A.,  Ph.D. .......... Iowa State

Assistant Professors:  

Barkoulas, John,  Ph.D. .......... Boston College  

Bruce, Donald,  Ph.D. .......... Syracuse  

Evans, Mary F.,  Ph.D. .......... Colorado  

Gilpatric, Scott M.,  Ph.D. .......... Texas A&M  

Mohsin, Mohammed,  Ph.D. .......... York  

Munikin, Murat,  Ph.D. .......... Indiana  

Santore, Rudy (Liaison),  Ph.D. .......... Ohio State  

Vossler, Christian A.,  Ph.D. .......... Cornell

Emeriti Faculty:  

Moore, John R. (Distinguished Professor),  Ph.D. .......... Cornell  

Russell, Milton,  Ph.D. .......... Oklahoma  

Spiva, George A.,  Ph.D. .......... Texas  

Neale, Walter C.,  Ph.D. .......... London

The Department of Economics offers graduate programs leading to the M.A. and Ph.D. The M.A. may be completed by either a thesis or non-thesis option, while the Ph.D. requires successful completion of a dissertation. Applicants to these programs should contact the Director of Graduate Studies, Department of Economics, for further information.

ACADEMIC STANDARDS

A graduate student 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 graduate 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 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.

STUDENT'S RIGHT TO PETITION

Graduate students in good academic standing have the right to petition the department for modification of departmental degree requirements and redress of grievances. Petitions must be in writing and addressed to the Director of Graduate Studies.

THE MASTER'S PROGRAM

Admission to the M.A. program is based on undergraduate academic performance and on scores from the general portion of the GRE. The student may choose either the thesis or non-thesis option. The non-thesis option requires 30 hours of coursework at the 400 level or above. Of these, at least 24 hours (at least 18 hours of which are in economics) must be at the 500 level or above. Of the minimum of 18 hours in economics at the 500 level or above, 12 hours must consist of 511, 512 and 513, 514, and the remaining 6 hours must be in one field of economics. Of the 30 hours, a maximum of 9 hours in courses approved by the department may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination.

The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above, 6 hours of which may be thesis hours. Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 6 hours may be in an area other than economics.

THE DOCTORAL PROGRAM

Admission to the Ph.D. program is based on promise of outstanding scholarship as demonstrated by previous academic performance, by scores achieved on the general portion of the GRE, and by recommendations. The program requires a minimum of 48 hours of coursework beyond the bachelor's degree or 24 hours beyond the master's degree, at least 24 hours of 600 Doctoral Research and Dissertation, and successful completion of the following:

ECONOMICS
1. Students are required to complete the following core requirements:
   a. Economic Theory: Microeconomic theory and macroeconomic theory by a qualifying exam taken not later than the beginning of the fourth semester of study.
   b. History of Economics: Completion of 515 with a grade of B or better, or, by qualifying examination.
   c. Quantitative Methods: Completion of 581, 582 and 583 with grades of B or better, or by qualifying examination.
   Students failing a qualifying examination must retake the examination the next time offered. A qualifying examination may be taken a third time only with approval of the department. Failing a qualifying examination for a third time will result in dismissal from the doctoral program.

2. Students are required to demonstrate competence by comprehensive examination in at least two fields of specialization in economics. Students failing a comprehensive examination must retake the examination the next time offered. A comprehensive examination in a specialization must be taken a third time only with approval of the department.

3. Students are required to complete with a grade of B or better two elective courses in economics at the 500 level or above, outside the core subject areas and outside the fields of specialization. These elective courses are required to complete a doctoral dissertation and to defend it successfully before the faculty.

MINOR IN ENVIRONMENTAL POLICY

The program is designed to give master’s and doctoral level graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. While administered through the Economics Department, the program is coordinated by a committee of representatives from the following participating departments and programs: Agricultural Economics and Rural Sociology; Botany; Civil and Environmental Engineering; Ecology and Evolutionary Biology; Economics; Forestry; Wildlife and Fisheries; Geography; Management; Planning; Political Science; and Sociology.

Students may request admission to the minor following admission to a graduate program in one of the participating departments. Students in good standing in one of these programs may apply for admission to the minor in environmental policy. The coordinating committee will consider the admission of interested students. Applicants should have a background in both natural and social sciences evidenced by prior coursework or experience. One course in environmental studies from the student’s major discipline and one course in quantitative methods are required. These requirements may be fulfilled before or after admission to the minor. All students admitted to the minor must register for at least three hours of Economics 579, Environmental Policy Research Workshop, and to complete successfully the following:

1. Ecology and Evolutionary Biology 520 or Plant and Soil Sciences 414 or Geography 433 or an equivalent course approved by the coordinating committee.

2. Six hours of coursework outside the major discipline approved by the coordinating committee.

Doctoral students seeking a minor in environmental policy must also complete, in addition to above, a policy-relevant dissertation approved by the coordinating committee.

GRADUATE COURSES

400 Special Topics (3) Topics vary. Prereq: Determined by department. May be repeated.


462 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Major writing requirement. Prereq: 201.

471 Public Finance: Optimal Government Functions and Expenditure Analysis (3) Problems of collective consumption, external effects, public investment, social decision making. Major writing requirement. Prereq: 201.

472 Public Finance: Taxation and Intergovernmental Relations (3) Analysis of individual taxes and of tax systems, non-tax sources of revenue; fiscal federalism. Prereq: 201 or 511 Microeconomic Theory.

482 Introduction to Mathematical Economics (3) Application of basic mathematical tools: calculus, matrix algebra, etc. to major topics of economic theory. Prereq: Intermediate Microeconomics with B or better and Calculus.

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

502 Registration for Use of Facilities (1-15) 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.


513-514 Macroeconomic Theory (3,3) Dynamic equilibrium models, endogenous growth theory, credibility of monetary policy, budget deficits and fiscal policy, consumption, investment, asset pricing, overlapping generations models, real business cycle, search theory, and open-economy macro models.


537 Managing in a Regulated Economy (3) Economic effects of antitrust and public utility, international and environmental regulation on business. Development and deployment of decision-making skills in areas of governmental-business relations.

577 Environmental Economics and Policy Management (3) Interdisciplinary perspective on goals of sustainable economic development and environmental quality. Development of decision-making tools and conflict resolution.


582-583 Elements of Econometrics I-ll (3,3) Elementary econometric concepts and techniques. Least squares and maximum likelihood estimation, specification and econometric problems, statistical inference, generalized least squares, simultaneous equation models, applications of concepts to economic problems, regression, introductory statistical methods.

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

613 Advanced Macroeconomic Theory (3) Prereq: 514 or equivalent.

621 International Economics (3) Comparative advantage, trade migration, commodity composition of trade, protectionist devices, protectionist arguments, trade liberalization, U.S. trade policy, exchange rate determination, balance of payments adjustment, multinational corporations, and international capital flows. Prereq: 512 and 514.

622 International Finance (3) Analysis of macroeconomic adjustment in open economies, with attention to foreign exchange markets, balance of payments, international policy coordination, integration of world capital markets, liberalization of trade, international capital mobility and the international monetary system. Prereq: 512 and 514.

623 Economic Development: Theories and Policies (3) Principal theories explaining economic behavior in developing countries. Policies and strategies used to promote development. Prereq: Undergraduate degree in economics or consent of instructor.

624 Economic Development: Western Impact on Asia and Africa (3) Studies of consequences of contact between developed world and developing countries of Asia and Africa. Prereq: 21 hrs of upper division undergraduate social science or consent of instructor.

631 Industrial Organization (3) Standard models of imperfect competition, oligopoly, and asymmetric information. Topics include pricing with market power and strategic decision making. Prereq: Consent of instructor.

632 Industrial Organization II (3) Economics of regulation and antitrust. Topics include public utility regulation, consumer product regulation, occupational safety and health, environmental protection, antitrust legislation, and anti-trust legislation. Prereq: Consent of instructor.

651 Monetary Theory (3) Study of money, credit, and liquidity as related to real output determination, interest rates, employment, and prices. Prereq: 513.

652 Topics in Monetary Theory (3) Advanced monetary models, issues in monetary policy, open economy monetary theory and policy. Student participation. Prereq: 651.

661 Regional and Urban Location and Development Theory (3) Theory of industrial and agricultural location and human migration. Economic basis for land-use patterns, central places, and urban form. Spatial inequalities and urban problems. National policies for regional and urban assistance.

662 Methods of Regional and Urban Analysis (3) Theory of regional/urban economic structure and growth. Regional income and product accounts, shift and share analysis, economic base studies, and regional/urban input-output models. Theory and problem solution.


672 Public Finance: Taxation and Intergovernmental Relations (3) Theory of taxation; tax incidence and tax efficiency; policy analysis of U.S. tax structure at federal, state, and local levels. Theory of fiscal federalism and intergovernmental relations.
677 Environmental and Natural Resource Economics (3) Alternative paradigms for allocating and valuing environmental resources. Exploration of issues related to market failure and differences between renewable and nonrenewable resources.

678 Economics of Environmental Policy (3) Topics in environmental policy analysis. Consideration of alternative policy instruments, defining policy objectives and role of risk in decision-making process.

682 Advanced Topics in Cross-Section Econometrics (3) Models with limited dependent variables, panel data analysis, nonparametric estimation, selection models and duration models. Prereq: 582-583 or equivalent.

683 Time Series Econometrics (3) Univariate and multivariate time series modeling of economic data: AR, MA, ARMA, VAR; models of non-stationary time series-unit roots, cointegration and error correction models; time series models of heteroskedasticity-ARCH, ARCH-M, GARCH; exogeneity and causality. Prereq: 582-583 or equivalent.

690 Workshop (3) Advanced topics in economics. Student participation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

693 Independent Study (1-3) Directed research on topic of mutual interest to faculty and student. Variable title for transcript purposes. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

ADMISSION TO THE PH.D. IN EDUCATION

Application Process

Individuals seeking admission to the Doctor of Philosophy degree in Education must first be admissible to the University of Tennessee (see the Graduate Studies: Admission Requirements section of this catalog) and then admitted to a concentration within the Ph.D. in Education. Prospective students are encouraged to make application at least 6-months before anticipated matriculation or one year in advance for School Psychology (i.e., Deadline: January 1.) An online application process is available at http://www.cehs.utk.edu/departments.html.

Admission Criteria

An applicant seeking admission to the Ph.D. in Education should earn GRE scores equal to or higher than the 50th percentile for both the Verbal and Quantitative subtests of the GRE (minimum 1070-total points, based on October 1998-September 2001 norms for the Verbal and Quantitative subtests). An applicant scoring less than the 50th percentile on the Quantitative subtest will be expected to earn a sufficiently higher score on the Verbal subtest to equal or exceed the 1070-point total. Applicants are expected to submit a minimum score of 4.0 points on the Analytic Writing. Non-native English speaking applicants and applicants who took the GRE prior to October 2002 should consult the faculty staffing the concentration of interest for additional details regarding the GRE minimum scores.

Additional information on admission criteria (e.g., GRE, letters of reference, writing samples, etc.) is available at http://www.coe.utk.edu/degrees/phd/phd guidelines/WebVersion.pdf and in the Fields of Instruction section of this catalog, see specific academic department.

CORE COURSES

<table>
<thead>
<tr>
<th>Courses</th>
<th>Minimum Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Area</td>
<td>15</td>
</tr>
<tr>
<td>Core Requirements:</td>
<td></td>
</tr>
<tr>
<td>Seminar in primary concentration</td>
<td>3</td>
</tr>
<tr>
<td>Philosophy of science or history/philosophy of education (select one from Philosophy 446 or 546 or courses identified in the addendum to Ph.D. guidelines or Cultural Studies in Education 607)</td>
<td>3</td>
</tr>
<tr>
<td>Theoretical foundations and/or applications (select one):</td>
<td>3</td>
</tr>
<tr>
<td>Learning and curriculum theory (Educational Psychology 609, 515, or Psychology 560)</td>
<td>3</td>
</tr>
<tr>
<td>Administrative/leadership theory (Educational Administration and Supervision 513, 680, or Educational Administration and Policy Studies 514)</td>
<td>3</td>
</tr>
<tr>
<td>Group dynamics (Counseling 554)</td>
<td>3</td>
</tr>
<tr>
<td>Instructional technology (Instructional Technology and Educational Studies 573 or 575)</td>
<td>3</td>
</tr>
<tr>
<td>Trans-college seminar: two consecutive semesters (Education 601)</td>
<td>2</td>
</tr>
<tr>
<td>Concentration</td>
<td>15</td>
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<tr>
<td>Minimum 15 credit hours selected from a concentration</td>
<td>15</td>
</tr>
</tbody>
</table>

Specialization

Minimum 9 credit hours selected from a specialization ................. 9

Cognate

Minimum 6 credit hours selected from outside the college (not to include research courses) ................. 6

Dissertation .................................................. 24

Note: Please refer to the Fields of Instruction (i.e., academic department) of this catalog for additional information on course requirements.

Residency

The residency requirement for students in the Ph.D. in Education is three consecutive semesters of full-time enrollment.

Contact Information

Additional information on the Ph.D. in Education is available in the Fields of Instruction section of this catalog (i.e., academic department), through the College’s Student Services Center, Claxton Complex A332, or at http://ceehs.utk.edu/main.html.

GRADUATE COURSES

574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze effectiveness of teaching and of professional development. Study and application of various approaches. Coreq: 575.

575 Professional Internship in Teaching (1-8) Intensive teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to postbaccalaureate students in professional year program. Prereq: Admission to Teacher Education program. May be repeated. Maximum 12 hrs. S/NC only.

576 Practicum in Classroom Teaching (1-8) Teaching and teaching-related experiences in elementary and secondary school settings. Specific hours and school level assignment determined by licensure or certification requirements. May not be used for probationary licensure year. May not be used toward degree requirements. May be repeated. Maximum 12 hrs. S/NC only.

589 Field Experience (1-3) Application of curricular and instructional principles, methods, and materials in schools. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

591 Clinical Studies (4) Group and individual seminar activities during full-time internship. Application and evaluation of professional core competencies. Completion and presentation of portfolio and analysis of teaching project. Coreq: 575.

601 Trans-College Seminar (1) Introduction to Ph.D. program in Education: research requirements, meaning of scholarship in academe and issues/problems in education. Minimum of two consecutive semesters preceded or followed by summer term required of all Ph.D. students. Prereq: Admission to Ph.D. program or consent of Ph.D. program coordinator. May be repeated. Maximum 3 hrs. May not be used to meet 600 requirement. S/NC only.
Educational Administration and Policy Studies

(College of Education, Health, and Human Sciences)

MAJORS DEGREES

College Student Personnel ............... M.S.
Educational Administration ............. M.S., Ed.S.
Educational Administration and Policy Studies ................ Ed.D.
Education .................................. Ph.D.

Olga Welch, Interim Head

Professors:
Bogue, Grady, Ed.D. ...................... Memphis State
Brewer, Ernest W., Ed.D. .............. Tennessee
Mcninis, Malcolm, Ph.D. .............. Florida State
Mertz, Norma T., Ed.D. ............... Columbia
Petty, Gregory C., Ph.D. .......... Missouri
Ubben, Gerald C., Ph.D. .......... Minnesota

Associate Professors:
Anfara, Vincent, Ph.D. ............... New Orleans
Norris, Cynthia, Ed.D. .............. Tennessee

Assistant Professors:
Patterson, Faye E., Ed.D. .......... Tennessee

The Department of Educational Administration and Policy Studies participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science
College Student Personnel
Educational Administration
Leadership 21

Specialist in Education
Educational Administration
Educational Administration and Supervision
Doctor of Education
Educational Administration and Policy Studies
Educational Administration and Policy Studies
Higher Education
Doctor of Philosophy

Education
Educational Administration and Policy Studies

The mission of the Department of Educational Administration and Policy Studies is to prepare entry-level and executive-level administrators for schools and colleges, and to prepare policy scholars to serve in these organizations and in state, regional, and national policy agencies associated with the educational and human service enterprise. The graduate degree programs in the department are designed to enrich the knowledge, skills and values requisite to effective leadership in educational practice settings. The department views leaders as stewards and servants of organizations; designers of the social and cultural climate in which we do our work; teachers that facilitate human growth and development; change agents who continually examine the effectiveness of their organizations; and conceptual provocateurs who challenge ideas and assumptions on which practice and policy are built.

The graduate programs in Educational Administration and Policy Studies focus on the preparation and development of administrative and instructional leaders who will serve in the diverse settings of schools and colleges, community and human service agencies, adult and continuing education organizations, and educational units of government.

THE MASTER’S DEGREES

The department offers a Master of Science degree with a major in College Student Personnel and a Master of Science degree with a major in Educational Administration.

• College Student Personnel

The major in College Student Personnel (CSP) is a practitioner-oriented program that offers training in university administration. It is designed for individuals interested in entering higher education administration in those areas that serve students and lend support to the effective operation and development of educational institutions. The program prepares students for a wide variety of positions including Admissions, Career Planning and Placement, Academic Advising, Student Activities, Student Records, Residence Life, Development, Alumni Affairs, and Athletics. Students in the program are encouraged to gain practical experience by participating in practica throughout the University as well as in local area colleges.

Admission Requirements

Students are admitted to the CSP program each spring for matriculation in the fall. Prospective students must submit current GRE scores (within the last five years). In addition, the following information must be submitted to the departmental office by March 1: CSP Program Application Form (http://web.utk.edu/~collsp); 3 rating/reference forms; application to the School of Graduate Studies. It is recommended that all materials be submitted by February 15.

Degree Requirements

The CSP program requires a minimum of 36 hours including six hours of practicum experience. Students are required to complete either a thesis or problems in lieu of thesis as a culminating activity.

• Educational Administration

Leadership 21 concentration is offered under Educational Administration. In both content and process, the Leadership 21 curriculum is directed toward providing beginning practitioners with the “best practices” knowledge and skills derived from the field and from research, and encourages transfer of these “best practices” into their work settings.

Leadership 21
This concentration is designed to prepare school principals and supervisors for licensure in Tennessee and for success in their initial administrative assignments.

Leadership 21 is an NCATE approved program that follows the Interstate School Leaders Licensure Consortium (ISLLC) Performance Standards and the National Policy Board for Educational Administration (NPBEA) recommendations for the knowledge, skills, and dispositions required today for school principals and administrators. The Leadership 21 program begins each year in the summer term. The four major themes of the program are as follows:

1. Expansion of the knowledge base that forms the framework for leadership and a broader conceptualization of educational organizations;
2. Emphasis on the performance dimensions of the principalship and administration with particular attention given to the knowledge, skills, and dispositions underlying performance;
3. Integration of theory and practice;

Admission Requirements

Applicants must complete the graduate and Leadership 21 application forms by March 15th. A grade point average (GPA) of 2.7 or higher for undergraduate work or GPA of 3.2 or higher for prior graduate work is required. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Candidates for the Educational Administration major must possess leadership potential preferably demonstrated by previous leadership experience. Three rating forms must be provided with recommendations from three present or former employers that identify a candidate’s strengths, weaknesses, and leadership potential.

Degree Requirements

The M.S. degree in Educational Administration requires a minimum of 36 hours of study including a site-based internship. A full comprehensive examination is required including the presentation of a professional portfolio. For licensure, students must pass an examination required by the state of Tennessee.

THE SPECIALIST DEGREE

The department offers a Specialist in Education degree with a major in Educational Administration. This degree is designed for those students who already possess a master’s degree. This degree may be used for the school administrator licensure (see admission and degree requirements under Leadership 21).

Admission Requirements

Applicants must complete all applications forms by March 15th. These include the School of Graduate Studies application and for those interested in licensure, the Leadership 21 application. A current GRE score is required for admission and a grade point average (GPA) of 2.7 or higher for undergraduate work or GPA of 3.2 or higher for prior graduate work is required. Three rating forms must be provided with recommendations from three present or former employers that identify a candidate’s strengths, weaknesses, and leadership potential.
Degree Requirements

Programs leading to the Ed.S. degree in Educational Administration require a minimum of 39 hours of study. A final comprehensive examination is required as is a culminating research paper or thesis depending on the program.

THE DOCTORAL DEGREES

Program Goals and Accents

Doctoral study in the Department of Educational Administration and Policy Studies is designed to prepare executive level administrators in school, college, and human services settings and to prepare policy scholars for policy organizations related to education. The Department offers the Doctor of Education (Ed.D.) degree and a Doctor of Philosophy (Ph.D.) degree.

Doctoral study is designed (1) to accent the heritage of educational enterprise and its centrality to the strength of a democratic society, (2) to equip students with the disposition and skills to challenge the status quo and to engage in evaluative policy dialogue and scholarship regarding the role and performance of educational and workforce development/training organizations, (3) to link competence and conscience via the study of ethics and to exemplify in practice those values previously cited, (4) to emphasize involvement in and exposure to educational experiences with international import, and (5) to accent leadership as a conceptual, moral, and performing art built on reflective traffic between theory and practice.

The department places high value on community—a community of shared purpose and caring, of shared values and responsibility. The departmental Leadership Forum creates a regular and common opportunity for students and faculty to explore contemporary policy issues and to develop a community of scholarship. The Leadership Forum is an educational experience in which students, and faculty, learn to create and maintain community by holding competing impulses and ideas in balance—to revere heritage and to manage change, to honor both service and profit motives.

FINANCIAL ASSISTANCE OPPORTUNITIES

The department offers a variety of scholarship and financial assistance opportunities for qualified students. Graduate Assistantships are also available. For application forms and information about financial aid and other information about the graduate programs in Educational Administration and Policy Studies, write to the Department of Educational Administration and Policy Studies, The University of Tennessee, A325 Claxton Complex, Knoxville, Tennessee 37996-3430.

Educational Administration and Policy Studies

GRADUATE COURSES

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

502 Registration for Use of Facilities (1-15) 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/NC option.

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. S/N/NC only.

513 Administrative and Organizational Theory (3) Introduction to theoretical and administrative and organizational foundations of management and leadership of educational programs and institutions.

514 Leadership Themes in Literature (3) Review and analysis of leadership and decision-making functions in biographies, poetry, plays, essays, personal letters and speeches, history—for lessons that enhance understanding of leadership role, values, and effectiveness.

515 Human Relations and Communication in Administration (3) Development and use of effective interpersonal communication skills and channels, in-group relations, supervision, work climates, personnel motivation, conflict management skills, and role of values, attitudes, and expectations in administration.

516 Research Methods (3) Descriptive, experimental, and quasi-experimental designs to help students without quantitative backgrounds to read and understand statistical professional literature. Introduction to inferential statistics, needs assessments, and evaluation procedures.

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

523 Administration of Special Services (3) Legal, programmatic, and ethical responsibilities of educational administrators in design and implementation of special service programs within school settings. Special learner characteristics, program categories, service delivery models, and legal/ethical frameworks. Inclusion and full service delivery.

529 Politics and Public Relations in Education (3) School/community relations in political context of modern, complex society and supervisory competencies: political, social, ethnic, cultural, and racial environments in which schools operate.

534 Program Evaluation in Education (3) (Same as Curriculum, Educational Research and Evaluation 534.)

535 Administrative Applications of Micro Computers (3) DOS, word processing, data based management, spread sheets, and computer communications. Review and development of specific administrative applications: scheduling, attendance, student record systems, and accounting.

536 Policy Issues in Higher Education Quality Assurance (3) Exploration of historic and contemporary approaches to definition and demonstration of quality in higher education. Discussion of contemporary policy issues related to quality assurance in colleges and universities.

537 Student Assessment in Higher Education (3) 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.

542 The College Student and the Court (3) Legal precedent affecting student personnel services in public higher education. Student discipline, housing, dress, organizations, activities fees, tuition and related federal regulations.

543 American Higher Education in Transition (3) History, philosophy, purposes, functions, organizations and programs in American higher education.

544 School Finance and Business Management (3) For prospective building level administrators. Financial and logical management tasks and procedures in individual school setting.

548 Supervision and Personnel Administration (3) Basic supervisory and personnel concepts and related competencies at the micro-organizational level: interviewing, personnel planning, collecting and maintaining personnel information, personnel evaluation, performance appraisal and staff development.

553 Strategic Planning (3) Processes for improving decision-making function through use of both quantitative and qualitative planning techniques. Policy analysis, CPM, PERT, Delphi.

554 Policy Issues in Educational Law, K-12 (3) Legal, programmatic, and ethical responsibilities of statutory materials for public school administrators and teachers; problems concerning law and public education. Prereq: M.S. introductory core or consent of instructor.

560 Grant Writing and Project Management (3) Examines processes of identifying funding for research efforts, as well as writing grant proposals, negotiating with funding sources, implementing and maintaining funded programs, and closing out projects at the end of funding support.
570 Student Affairs Administration in Higher Education: Theory and Practice (3) Historical, philosophical, and organizational perspective. Functional areas comprising field and major issues.

572 Student Development Theory and Practice in Higher Education (3) Theoretical framework of college student personnel services and practical application of theory in student services environment. Applicable administrative theory, human development theory and evaluation assessment techniques.

574 The College Student (3) Critical examination of the characteristics and concerns of current college students in relation to the direction and provision of student services and student personnel administration.

580 Internship in Educational Administration (3) Field experience in appropriate educational setting working directly with administrator. May be repeated up to 6 hours.

583 Educational Leadership—Principalship (3) Knowledge, skills and relationships for principals to be effective educational leaders. Simulation materials and field-based activities are used.

590 Special Topics (1-3) May be repeated.

592 Field Problems in Educational Administration and Supervision (3) Topic to be assigned. May be repeated. Maximum 6 hours. S/NC or letter grade.

593 Independent Study (1-3) Consent of instructor required. May be repeated. Maximum 9 hours. Satisfactory/No Credit or letter grade.

595 Seminar in School Leadership, K-12 (3) On-site study of quality school processes throughout the region. May be repeated. Maximum 6 hours. S/NC or letter grade.

599 Internship in College Student Personnel (1-6) Prereq: Consent of instructor. May be repeated. S/NC only.

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

604 Seminar in Educational Administration and Policy Studies (1-4) Directed readings and research in educational administration. May be repeated. Maximum 6 hrs. Satisfactory/No Credit grading only.

605 Advanced Seminar in Administrative Theory (3) Interdisciplinary seminar. Readings selected by faculty for research and scholarly values from early to current classic theoretical studies and current periodical literature in administrative and organizational theory.

606 Leadership Forum (2) Development of research, evaluation, policy analysis skills and critical analysis and evaluation of philosophical principles undergirding American education. Continuous enrollment for 2 years, on-campus, May be repeated. Maximum 12 hrs. S/NC only.

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. May be repeated at discretion of student's committee. Maximum 12 hrs. S/NC only.

612 Modes of Inquiry (3) Various inquiry approaches to research in education, related philosophical, methodological and ethical considerations in research design and in the use of research findings. (Same as Educational Psychology 612.)

614 Statistics for Educational Administrators (3) An introductory statistics course that focuses on the application of statistical procedures to problems in educational administration. Included are: scales of measurement, hypothesis testing, and descriptive and inferential statistical techniques. Computer applications are explored.

615 Research Design (3) The foundations of designing, conducting, and evaluating quantitative, qualitative, and mixed-methods research and the philosophical assumptions underlying these approaches. Topics covered include: identifying a research problem, reviewing the literature, specifying a purpose, writing research questions and hypotheses, and collecting and analyzing data.

616 Research Methods (3) The techniques of multiple regression, analysis of covariance, and multivariate analysis as applied to problems in educational administration. Computer applications are explored. Prereq: 614.

617 Case Study Methods in Educational Research (3) Methods, techniques and strategies consistent with case study approaches to inquiry in educational and related settings. Prereq: 615.

619 Administration and Governance of Higher Education (3) Trends, structure and process of collegiate governance. Development of understanding of administrative theory and practice in higher education.

629 Seminar in Policy Issues in Education (3) Local, state, and federal education policy; theory analysis, development and implementation. Why education policy is changing rapidly, ways to follow and influence education policy, and conceptual frameworks to use for future understanding.

640 Policy Issues in College and University Law (3) Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty termination, religious freedom, tort liability, administrative law, academic due process and affirmative action in employment.

645 Curriculum and Instruction in Higher Education (3) Examination of teaching, learning and curriculum in higher education.

646 Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation.

650 Fiscal Policy Issues in Higher Education (3) Revenue sources, appropriation process, budget procedures, cost analysis, and fiscal management in public and independent colleges and universities.

656 Legal Issues in Education (3) School law; constitutional foundations as they relate to public education at state and local levels.

658 Conflict Management (3) Social conflict and its management. Causes of interpersonal, intergroup, and organizational conflict, skills and strategies used to manage conflict, conflict management models associated with different sectors of human activity, and current organizational practices for managing destructive conflict.

670 Values and Ethics in Educational Leadership (3) Examination of moral and ethical dimensions of the work of educational leaders.

680 Administration of Complex Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational programs and organizations.

690 Special Topics (1-3) May be repeated.

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

**Educational Psychology and Counseling**

(College of Education, Health, and Human Sciences)

**MAJORS**

<table>
<thead>
<tr>
<th>DEGREES</th>
<th>Counseling</th>
<th>Education</th>
<th>Educational Psychology</th>
<th>Educational Psychology and Counseling</th>
<th>School Counseling</th>
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School Psychology ................................ Ed.S.

R. S. McCallum, Head

Professors:

Brockett, Ralph G., Ph.D. ............... Syracuse

George, Thomas W., Ed.D. .............. Tennessee

Greenberg, Katherine H., Ph.D. ........ George Peabody

Huck, Schuyler W., Ph.D. .............. Northwestern

Kronick, Robert F., Ph.D. ............. Tennessee

McCalm, R. S., Ph.D. ................. Georgia

McClam, K., Ph.D. ..................... South Carolina

Peters, John M., Ed.D. ................ NC State

Peterson, Marla P., Ph.D. .............. Ohio State

Poppen, William A. (Liaison), Ph.D. .... Ohio State

Skinner, Christopher H., Ph.D. ........ Lehigh

Thompson, Charles L., Ph.D. .......... Ohio State

Williams, R. L., Ph.D. ............... George Peabody

Woodside, M.R., Ed.D. ............... VPI

Associate Professors:

Bain, Sherry K., Ph.D. .............. Southern Mississippi

Davis, J., Ph.D. ..................... New Mexico

Ziegler, Mary F., Ed.D. ............... Columbia

Assistant Professors:

Conwill, William L., Ph.D. .......... Stanford

Diambra, Joel F., Ed.D. ............. William & Mary

Skinner, Amy L., Ph.D. .............. Mississippi State

Research Professors:

Cassell, Jack L., Ph.D. ............... Kansas

Colvin, Craig R., Ed.D. ............... Virginia

Mulkey, S. Wayne, Ph.D. ............. Florida State

The Department of Educational Psychology and Counseling offers graduate programs leading to degrees, majors, and concentrations in:

<table>
<thead>
<tr>
<th>Master of Science</th>
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<tbody>
<tr>
<td>Educational Psychology</td>
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<tr>
<td>Adult education</td>
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<tr>
<td>Applied educational psychology</td>
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<td>Counseling</td>
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<td>Mental health counseling</td>
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<td>Rehabilitation counseling</td>
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<td>School counseling</td>
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<td>Educational Psychology and Counseling</td>
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<td>Collaborative learning</td>
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<td>Education</td>
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<td>Counselor education</td>
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**EDUCATIONAL PSYCHOLOGY**

• Adult Education

The Adult Education program is designed for those interested in providing learning opportunities for adults. It is intended for educators of adults in a wide range of settings such as adult literacy, continuing higher...
education, business and industry, government community-based organizations, volunteer agencies, and professional and staff development programs. The program prepares individuals for such roles as program planner, instructor, trainer, and administrator. Degrees offered are the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). For details, see web site at http://web.utk.edu/~adulted/

MASTER OF SCIENCE (M.S.)
Educational Psychology major
Adult Education concentration

The Master's program involves a minimum of 36 hours of course work (except for the Thesis option, which is 33 hours minimum). Programs typically consist of the following:

Adult Education Core (15 hrs.)
EP 513 - Reflective Practice in Education and Psychology (3 hrs.);
EP 520 - Survey of Adult Education (3 hrs.);
EP 521 - Program Development and Operation in Adult Education (3 hrs.);
EP 522 - Adult Development (3 hrs.);
EP 525 - Characteristics of Adult Learners (3 hrs.);
Research (3 hrs.).

Options could include:
EP 550 - Statistics and Research Design: Conceptual (3 hrs.);
CSE 560 - Introduction to Qualitative Research in Education (3 hrs.);
EAS 516 - Research for School Administrators (3 hrs.);
EP 530 - Methods of Collaborative Inquiry (3 hrs.);
ITCE 561 - Educational Statistics (3 hrs.); or
ITCE 580 - Techniques of Research in Curriculum and Instruction (3 hrs.).

Courses Outside of Educational Psychology (6 hrs.)
This category will include course work outside of Educational Psychology that provides a more specialized focus to the program or as a complement to current professional competencies. Some examples of possible supporting areas include: higher education, counseling, educational administration and supervision, cultural studies, sociology, psychology, human resource development, and agricultural and extension education.

Departmental Electives (12+ hrs.)

The remaining hours of course work can be taken in a combination of electives within adult education or course work in related areas. Examples of courses in Educational Psychology that meet this expectation include:
EP 460 - Self-Management in the Helping Professions (3 hrs.);
EP 504 - Special Topics (1-3 hrs.).

(Recent examples have included Multicultural Perspectives in Adult Education, Learning in the Workplace, and Writing for Professional Publication)

EP 509 - Internship in Adult Education (3 hrs.);
EP 510 - Psychological Theories of Human Development Applied to Education (3 hrs.);
EP 514 - Individual Study in Adult Education (3 hrs.);
EP 515 - Educational Applications of Behavioral Theories of Learning (3 hrs.);
EP 516 - Educational Applications of Cognitive Learning Theories (3 hrs.);
EP 523 - Post-Secondary Education for Adults (3 hrs.);
EP 524 - Continuing Professional Education (3 hrs.);
EP 527 - Controversies in Adult Education (3 hrs.);
EP 528 - Psychology of Aging (3 hrs.);
EP 529 - Facilitating Adult Learning (3 hrs.);
EP 573 - Meeting the Needs of Nontraditional and Underachieving Learners (3 hrs.);
EP 574 - Facilitating Group Change (3 hrs.).

Comprehensive Examination/Thesis

Most students opt to write a comprehensive examination. This involves preparing written responses to questions from the student's graduate committee. Typically, these are done in a take-home format. However, a thesis option is also available. The thesis is an original piece of research. Students who opt to write a thesis register for 6 hours of EP 500. The final document is presented to the student's graduate committee and discussed in an oral examination with the committee.

DOCTOR OF PHILOSOPHY (Ph.D.)
Education major
Educational Psychology concentration—Adult Education specialization

The Ph.D. specialization in Adult Education involves a minimum of 80 hours of study beyond the master's degree. This includes at least 56 hours of coursework and 24 hours of dissertation. These hours are distributed as follows:

Concentration 15 hours
Specialization 9 hours
Research 15 hours
Ph.D. Core 11 hours
Cognate 6 hours

The concentration consists of courses selected from various areas within the Educational Psychology and Counseling, which can include selected courses in adult education. Courses for the specialization are from adult education courses such as those listed under the masters' degree requirements and electives. To meet the research requirement, students take courses that provide them with knowledge and skills in both quantitative and qualitative research methods. The Ph.D. core consists of a seminar in the specialization along with courses listed elsewhere in this catalog. At least 6 hours must be taken in a cognate area outside the College of Education, Health, and Human Sciences. Finally, dissertation hours are taken after all or most coursework is completed; once begun, students must register for a minimum of 3 hours until the dissertation is completed.

• Applied Educational Psychology

The Applied Educational Psychology Area is designed for individuals who seek to provide professional leadership in promoting and facilitating learning and/or its measurement. It offers two degree programs: Master of Science with a major in Educational Psychology, concentration in applied educational psychology, and Doctor of Philosophy with a major in Education, concentration in educational psychology, specialization in applied educational psychology.

For details, see web site at http://web.utk.edu/~appedsy/

MASTER OF SCIENCE (M.S.)
Educational Psychology major
Applied Education Psychology concentration

The basic goal of the master's program is to develop expertise in the promotion of adaptive learning for all kinds of learners in both individual and group settings. The program includes most of the traditional themes in educational psychology (e.g., development, learning principles, assessment, and psychoeducational intervention). It is unique because of a focus on promoting the collective knowledge of groups as well as the development of individuals.

The master's program may be used as a stepping stone for entering a doctoral program in educational or school psychology or as additional preparation for functioning in an educational role in schools, mental health centers, and business programs devoted to personal and professional development. The faculty members in the Educational Psychology (EP) Department are committed to the creation and study of environments that enhance learning potential and promote lifelong learning for people of all ages, abilities, and backgrounds.

Each student completes 36 hours beyond the baccalaureate degree. A minimum of 24 hours must be at the 500 level or higher. At least 6 hours must be taken outside the department. These hours are distributed across the following categories:

Hours
1. Development 6
2. Learning Principle 9
3. Research 3
4. Assessment 3
5. Intervention 12

The courses related to development help students explore the role of development in learning for more able learners. The courses related to learning principles provide an opportunity to compare behavioral and cognitive learning theories in depth and other theories in comparison. Students may study characteristics of adult learners as well as children. The emphasis is
on comparing individual and collaborative learning principles. Students will explore statistics and research from a conceptual perspective. The assessment course provides an overview of assessment concepts, approaches, and issues. The courses related to intervention include exploration of approaches for meeting the needs of nontraditional and underachieving students, program development and facilitation of adult learning, self-management and reflective practice, and facilitation of group change.

Students choose between thesis and non-thesis options. Requirements for the two options are provided in other program materials.

DOCTOR OF PHILOSOPHY (Ph.D.)
Education major
Educational Psychology concentration –
Applied Educational Psychology specialization

The Applied Educational Psychology Program provides study for students with varying interests in the areas of (a) human learning and development or (b) statistics and measurement. Students selecting the first area of emphasis focus on acquisition and participatory theories of learning and development and the role of the teacher/mediator of learning experiences. Doctoral Students selecting the second area of emphasis focus on quantitative methods, research design, and test construction. This program involves a community of learners in which beginning students, advanced students, and faculty members come together regularly to share with and learn from one another. The cornerstone of this program is a seminar attended by all students (for their first 3 years) as well as the Program’s faculty members. Collaboration on research projects, group trips to professional meetings, and social events also help to create the sense of “I belong; others care about me; and everyone benefits from the group’s array of skills, knowledge, background, and contacts.”

Regardless of his/her area of emphasis, each student completes 98 hours beyond the baccalaureate degree. These hours are distributed across the following categories:

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<tr>
<th>Hours</th>
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<tr>
<td>1. Concentration Core</td>
<td>15</td>
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<td>2. Specialization</td>
<td>27</td>
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<td>3. Research 15</td>
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<td>4. Ph.D. Core</td>
<td>11</td>
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<td>5. Cognate 6</td>
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<tr>
<td>6. Dissertation</td>
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The Concentration Core provides a grounding in educational psychology, with required courses such as Psychology of Learning, Theories of Human Development Applied to education, and Formal Measurement. The Specialization involves 12 hours of the doctoral seminar in Applied Educational Psychology, 3 hours of Facilitating Group Change, and 12 hours reflecting the student’s area of emphasis. Students with the Learning/Development emphasis, course options include (but are not limited to) Mediated Learning Theory, Educational Applications of Cognitive Learning Theories, Collaborative Learning, and Seminar in Cognitive Science. For students with the Statistics/Testing emphasis, course options include (but are not limited to) Survey Design and Analysis, Categorical Data Analysis, Applied Multivariate Methods, and Scale Construction.

To meet the 15-hour requirement in Research, students can elect to take a full set of courses that deal with quantitative methodologies (e.g., experimental design, Seminar in Applied Psychometrics) or they can elect to take a full set of courses that deal with qualitative methodologies (e.g., phenomenology, ethnography) or they can elect to take a mix of these courses.

The Cognate requires a minimum of two courses outside the College of Education, Health, and Human Sciences. Many students set up their cognate to be psychology or statistics, although other cognates are possible.

The requirements/options for the Ph.D. Core are listed elsewhere in this Catalog, as are the requirements for the 24 hours of Dissertation.

COUNSELING

The programs within the Counseling area prepare individuals as professional counselors and counselor educators in community mental health, human service and rehabilitation agencies, educational institutions, and private practice, government, business and industrial settings. The courses of study focus on professional identity, social and cultural diversity, human growth and development, career development, helping relationships, group work, assessment, and research and program evaluation. The degrees offered are Master of Science in Counseling with concentrations in School Counseling, Mental Health Counseling, and Rehabilitation Counseling: Educational Specialist in School Counseling; Doctor of Philosophy in Education with a concentration in Counselor Education. Each degree leads to counseling licensure. The Mental Health Counseling and School Counseling programs are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The graduate program in Rehabilitation Counselor Education (RCE) is designed to prepare students for professional careers as clinicians in the field of rehabilitation counseling. The RCE Program is service-oriented and includes practica and internship experiences. Completion of the 2 year (16 month) Program culminates in a Master of Science Degree. The Program is fully accredited by the Council on Rehabilitation Education (CORE).

Students may be admitted to the Program either full- or part-time. Full-time students admitted to the Program follow a sequence of courses that facilitates degree completion in 16 months. The first (fall) and third (summer) semesters are didactic in nature, but the second semester adds an experiential component under RCE 547 – Practicum in Rehabilitation. The final (fall 2) semester is experiential, with students working full-time to fulfill the 600-hour requirement of RCE 549 – Internship in Rehabilitation Counseling.

Students who are interested in working with people who are deaf or hard of hearing may choose the optional deafness focus area for their RCE masters program. This allows individuals who have bachelor degrees in deafness related fields to expand their competencies to serve rehabilitation consumers who are deaf or hard of hearing. Interested students must have knowledge of American Sign Language. Contact Terry Osborne at the Center on Deafness (COD) for details: (865) 974-4147 (voice/TTY).

Masters Program in Mental Health Counseling

The Masters Program in Mental Health Counseling, a 60-semester hour program, is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The program requires a 900-hour internship in the community during the second year to prepare students for practice. Students enrolled in Mental Health Counseling complete a program of study, which includes core courses, clinical courses, and electives. A thesis option is available for interested students. Through careful selection of electives and individualized programming, students are able to develop the skills to work in settings that emphasize alcohol and drug abuse, services to children, youth, families, and the elderly, and career development, employment, and correctional counseling. Graduates of the program will receive endorsement for licensure as a licensed professional counselor with mental health service provider designation (LPC) and for board certification by the National Board of Certified Counselors (NBCC).

Year 1:
- COUN 431 3
- COUN 525 3
- COUN 551 3
- COUN 554 3
- COUN 555 3
- COUN 556 3
- EDUC PSYCH 550 3
- PSY 512 3
- COUN 500 or electives 6
- Total program hours 30

Year 2:
- COUN 535 3
- COUN 552, 553 6
- COUN 559 9
- COUN 570 3
- PSY 672 3
- COUN 500 or electives 6
- Total program hours 30

Masters Program in Rehabilitation Counselor Education

The purpose of rehabilitation training programs is to ensure that skilled personnel are available to serve the rehabilitation needs of individuals with disabilities assisted through vocational rehabilitation (VR), supported employment and independent living programs. The University of Tennessee graduate program in Rehabilitation Counselor Education (RCE) is designed to prepare students for professional careers as rehabilitation counselors in community mental health, human service and rehabilitation agencies, educational institutions, and private practice, government, business and industrial settings. The courses of study focus on professional identity, social and cultural diversity, human growth and development, career development, helping relationships, group work, assessment, and research and program evaluation. The degrees offered are Master of Science in Counseling with concentrations in School Counseling, Mental Health Counseling, and Rehabilitation Counseling: Educational Specialist in School Counseling; Doctor of Philosophy in Education with a concentration in Counselor Education. Each degree leads to counseling licensure. The Mental Health Counseling and School Counseling programs are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The graduate program in Rehabilitation Counselor Education (RCE) is service oriented and is accredited by the Council on Rehabilitation Education (CORE). Students may be admitted to the Program either full- or part-time. Full-time students admitted to the Program follow a sequence of courses that facilitates degree completion in 16 months. The first (fall) and third (summer) semesters are didactic in nature, but the second semester adds an experiential component under RCE 547 – Practicum in Rehabilitation. The final (fall 2) semester is experiential, with students working full-time to fulfill the 600-hour requirement of RCE 549 – Internship in Rehabilitation Counseling.

Students who are interested in working with people who are deaf or hard of hearing may choose the optional deafness focus area for their RCE masters program. This allows individuals who have bachelor degrees in deafness related fields to expand their competencies to serve rehabilitation consumers who are deaf or hard of hearing. Interested students must have knowledge of American Sign Language. Contact Terry Osborne at the Center on Deafness (COD) for details: (865) 974-4147 (voice/TTY).
The program requires a 600-hour internship in a school site during the second year to prepare students for practice. Students enrolled complete a program that includes core courses, clinical courses, and electives. Those applicants who have not had teaching experience may be required to complete additional classes. Graduates will fulfill the license requirements for K-12 School Counseling in Tennessee and in most states of the United States although some states may have additional experience and testing requirements.

Year 1:
- COUN 431 3
- COUN 525 3
- COUN 550 3
- COUN 551 3
- COUN 552, 553 6
- COUN 554 3
- EDUC PSYCH 550 3
  Total program hours: 24

Year 2:
- COUN 555 3
- COUN 558 6
- COUN 561 3
- COUN 570 3
- EDUC PSYCH 510 3
- EDUC PSYCH 515 3
- TPTE 470 3
  Total program hours: 24

Total program hours: 48

EDUCATIONAL SPECIALIST (Ed.S)
School Counseling major

The Educational Specialist Program in School Counseling, a post Master’s program designed to provide advanced training for school counselors and others with a Master’s Degree in a related area. Graduates must complete at least 60 hours beyond the bachelor’s degree. Applicants for degrees in this field must present satisfactory evidence of academic ability, adequacy of personal characteristics and goals as determined by recommendations of employers, instructors, and colleagues, and by scores of the aptitude portion of the Graduate Record Examination. The program can serve the educational needs of the following: Experienced counselors whose original training pre-dated many recent advancements in counseling; Students holding M.S. degrees in guidance but wanting additional training; Individuals who wish to shift from one setting or level of counseling to another; Students from related areas who want to enter the school counseling profession.

Those applicants who have not had teaching experience may be required to complete additional classes. Graduates who desire to fulfill the license requirements for K-12 School Counseling in Tennessee and in most states of the United States are required to fulfill all the requirements for a licensure endorsement.*

For a student with a School Counselor License, the Ed S. program requires 22 semester hours beyond the MS. The program is individualized and planned by the student and a faculty committee. A minimum of six hours is required from outside the Counselor Education Program. Please refer to the current Graduate Catalog for general information on the Ed.S.

Year 1:
- School Counseling Core  COUN 555, 659, 570, 504, 650 13
- Courses outside the program area (six hours of electives) 6
- General elective 3
  Total program hours: 22

* Students without a license in school counseling are required to complete those requirements before obtaining an Ed. S. in School Counseling.

DOCTOR OF PHILOSOPHY (Ph.D.)
Education major
Counselor Education concentration

The doctoral concentration in Counselor Education at The University of Tennessee is designed to prepare experienced counseling professionals to advance their careers in the education and supervision of counselors. The doctoral program is for those students who have completed a master’s degree in counseling or counseling-related fields who aspire to one of the following careers: (1) college, university, or community college teaching positions in Counselor Education or related fields; (2) supervisory positions in schools, community agencies, state departments of education; (3) counseling positions in student development programs and counseling centers in higher education; (4) private mental health counseling/consultation practice; and/or (5) employee assistance positions.

The doctoral program requires a minimum of three full years of study beyond the master’s degree. The Ph.D. concentration in Counselor Education will seek accreditation from the Council for Accreditation of Counseling and Related Educational Programs (CACREP). Graduates of the Ph.D. concentration in Counselor Education will receive endorsement for licensure as professional counselors and/or licensure as school counselors. If licensure has not been received prior to entering the doctoral program.

Coursework for the program in Counselor Education includes the following:

CEHHS/Counselor Education Ph.D. Coursework Guidelines

- Concentration 33 Hours
  - COUN 553 (3 Hours): Career and Educational Information Systems and Resources
  - COUN 571 (3 Hours): Individual Cognitive Assessment OR COUN 671 (3 Hours): Personality and Vocational Assessment OR Educational Psychology 541 (3 Hours): Psycho Educational Assessment OR COUN 625 (3 Hours) Advanced Study in Personality
  - COUN 655 (3 Hours): Practicum in Counselor Education
  - COUN 660 (3 Hours): Advanced Theory and Practice in Counseling
  - COUN 665 (3 Hours): Group and Systems Theory and Interventions
  - COUN 670 (3 Hours): Theory and Practice of Counseling Supervision and Consultation
COUN 675 (3 Hours); Theory and Practice of University Teaching in Counselor Education
COUN 679 (6 Hours): Internship in Counseling Education
COUN 672 (3 Hours): Psychology of Dysfunction OR Psychology 573 (3 Hours); Descriptive and Theoretical Psychopathology OR Social Work 530 (3 Hours); Seminar in Clinical Social Work OR Educational Psychology 690 (3 Hours): Psychopathology of Children
Sociology 543 (3 Hours); Sociology of Development OR Social Work 532 (3 Hours); Community Organization OR Sociology 465 (3 Hours) Social Values and the Environment
• Specialization 9 Hours (Not Counselor Education)
• Cognate 6 Hours
• Core 11 Hours
  Seminar in Primary Concentration: COUN 650 (3 Hours); Seminar in Counseling Education
  Philosophy of Science (3 Hours) (substitute COUN 535 Ethical, Legal, and Professional Issues in Counseling)
  Theoretical Foundations and/or Applications (3 Hours)
  Trans college Seminar (2 Hours)
• Research 15 Hours
  9 Hours Quantitative Research including a two semester statistics sequence
  6 Hours Qualitative Research
• Dissertation 24 Hours
• Total 98 Hours

EDUCATIONAL PSYCHOLOGY AND COUNSELING

Collaborative Learning
The Collaborative Learning program addresses the advanced educational needs of professionals working in a variety of settings including business, government, higher education, and non-profit organizations. Participants study the collaborative learning process and engage in action research in the context of their own professional practices. The program offers the Doctor of Education (Ed.D.) degree. A cohort of doctoral students is admitted every other year. For details see web site at http://web.utk.edu/~collab.

DOCTOR OF EDUCATION (Ed.D.)
Educational Psychology and Counseling major

Collaborative Learning concentration

Doctoral students in Collaborative Learning are expected to complete a minimum of 93 hours of graduate credit above the baccalaureate degree. Required is a two-year residency, defined as a minimum of 6-9 credit hours of course work in each of six consecutive semesters, including summer terms. These hours are distributed among the following categories:

Concentration Core in Educational Psychology (15 hours). The Concentration Core consists of a minimum of one course in the area of Collaborative Learning and one course from each of the other specializations in Educational Psychology: Adult Education and Applied Educational Psychology.

Specialization Core in Collaborative Learning (24 hours). The specialization core consists of four courses in the area of Collaborative Learning plus the doctoral seminar. EP 630 Doctoral Seminar in Collaborative Learning is taken on a continuous basis, beginning with the first semester of the student’s residency and culminating at the end of the second year of residency, excluding summers. Three credit hours are awarded per semester for a total of 12 hours of credit.

Related Studies (30 hours). The related studies component incorporates three areas of study:

  Research Methods (12 hours). This set of courses normally includes courses in qualitative and quantitative research methods and statistics. EP 530, Methods of Collaborative Inquiries is required.
  Cognate (6 hours). Courses taken in an area outside the major area of study.
  Supporting Area (12 hours). Additional courses of the student’s choice that support his or her program emphasis.

Dissertation Research (24 hours). The focus of the student’s dissertation research is his or her own professional practice and therefore must involve some form of action research methodology.

SCHOOL PSYCHOLOGY

The School Psychology programs are based on a data-based decision making model and offer advanced training in psychological, educational, and professional foundations including training in assessment, research, consultation, and intervention. We offer two degree programs, an Ed.S. and a Ph.D. The school psychology programs are accredited or approved by the relevant bodies including the American Psychological Association (APA), the National Association of School Psychologists (NASP), the National council for Accreditation of Teacher Education (NCATE), the Tennessee Department of Education. Admission occurs once a year and materials are due by January 15. For details see web site at http://web.utk.edu/~schpsy.

SPECIALIST IN EDUCATION (Ed.S.)
School Psychology major

Every School Psychology student is expected to meet UT School Psychology Training Programs knowledge and skill requirements. Opportunities for students to meet these requirements will occur in the classroom and during field experiences. The School Psychology faculty, along with current and previous students, practicum and internship supervisors, and various other groups who help ensure quality control within our training programs have contributed to the development of our curricula. Various accrediting and curriculum oversight agencies (i.e., NASP, SDE-Tennessee; UT Ph.D. Coordinating Committee; and UT Graduate Admissions and Records) have their own specific goals and objectives. The School Psychology Handbook, published by the EP Department describes how the UT School Psychology Training Programs meets the goals and objectives of these various training groups.

The UT Program is designed to provide graded, sequential, and hierarchical training across the following areas A) Professional School Psychology, B) Consultation and Intervention, C) Assessment, D) Research and Statistics, E) Psychoeducational Core, and F) Field Experience and Professional Practice.

I. Professional School Psychology (15 credit hours)
1. EP 540 Seminar in School Psychology (3)
2. EP 635 Ethical, Legal, and Professional Issues in Psychology (3)
3. EP 650 Professional Practice in School Psychology (3)
4. EP 549 Internship (6)

II. Consultation and Intervention (27 credit hours)
1. CECP 551 Theory and Practice of Counseling (3)
2. Group Process and Change Option (3)
3. EP 515 Educational Applications of Behavioral Theories of Learning (3)
4. EP 517 Direct Assessment and Intervention for Academic Skill Deficits (3)
5. EP 545 Psychoeducational Consultation (3)
6. EP 546 Practicum in Consultation (3)
7. EP 516 Educational Applications of Cognitive Learning Theories (3)
8. EP 549 Internship (6)

III. Assessment (24 credit hours)
1. EP 517 Direct Assessment and Intervention for Academic Skill Deficits (3)
2. CECP 525 Formal Measurement in Education and Counseling (3)
3. EP 541 Psychoeducational Assessment (3)
4. EP 542 Practicum in Psychoeducational Assessment (3)
5. EP 541 Psychoeducational Assessment (3)
6. EP 542 Practicum in Psychoeducational Assessment (3)
7. EP 549 Internship (6)

IV. Research and Statistics (15 credit hours)
1. STAT 531 Survey of Statistical Methods I (3) OR ITCE 561 Educational Statistics (3)
2. EP 655 Research in Psychoeducational Studies (6)
3. EP 505 Quasi-Experimental and Single Subject Design Research (3)
4. EP 500 Thesis or Problem in Lieu of Thesis (3)
V. Psychoeducational Core (33 credit hours)
   1. SE 470 Psychology of the Exceptional Child (3)
   2. CECP 570 Cross Cultural Counseling: Theory and Research (3)
   3. PSY 461/561 Physiological Psychology (3)
   4. EP 690 Psychopathology of Childhood (3)
   5. EP 510 Psychological Theories of Human Development Applied to Education (3)
   6. EP 650 Professional Practice in School Psychology (3)
   7. EP 549 Internship (6)
   8. Group Processes and Change Option
   9. Family Studies Option
   10. Social Basis of Behavior Option

VI. Field and practica experiences by semester

Years 1-3
Research in the schools or with children (75 hrs.),
EP 655 Research in Psychoeducational Studies (4-6)

First Year, Fall and Spring:
Knowledge, roles and functions (75 hrs.)

Second Year, Fall:
Introduction to consultation and intervention practices (50 hrs.)

Second Year, Spring:
Develop consultation skills (150 hrs.)
EP 546 Practicum in Consultation

Third Year, Fall and Spring:
Practice professional assessment skills (e.g., admin., inter., rept. writ.-75 hrs./sem.)
EP 542 Practicum in Assessment

Total: 425 hours structured field experience

Year 4, Fall and Spring:
EP 549 Internship (9) knowledge and skill development and mastery (1200-1500 hrs.)

DOCTOR OF PHILOSOPHY (Ph.D.)
Education major
School Psychology concentration

Every School Psychology student is expected to meet UT School Psychology Training Programs knowledge and skill requirements. Opportunities for students to meet these requirements will occur in the classroom and during field experiences. The School Psychology faculty, along with current and previous students, practica and internship supervisors, and various other groups who help ensure quality control within our training programs have contributed to the development of our curricula. Various accrediting and curricula oversight agencies (i.e., APA, NASP, SDE-Tennessee; UT Ph.D. Coordinating Committee; and UT Graduate Admissions) have their own specific goals and objectives. The School Psychology Handbook, published by the EP Department, describes how the UT School Psychology Training Programs meet the goals and objectives of these various training groups. The UT School Psychology Program is designed to provide graded, sequential, and hierarchical training across the following areas: a) Professional School Psychology, b) Consultation and Intervention, c) Assessment, d) Research and Statistics, e) Psychoeducational Core, and f) Field Experience and Professional Practice.

I. Professional School Psychology (26 credit hours)
   1. EP 540 Seminar in School Psychology (3)
   2. EP 635 Ethical, Legal, and Professional Issues In Psychology (3)
   3. ED 601 Transcollege Seminar (2)
   4. EP 650 Professional Practice in School Psychology (9)
   5. EP 649 Internship (9)

II. Consultation and Intervention (30 credit hours)
   1. CECP 551 Theory and Practice of Counseling (3)
   2. Group Processes and Change Option (3)
   3. EP 515 Educational Applications of Behavioral Theories of Learning (3)
   4. EP 517 Direct Assessment and Intervention for Academic Skills Deficits (3)
   5. EP 545 Psychoeducational Consultation (3)
   6. EP 546 Practicum in Consultation (3)
   7. EP 516 Educational Applications of Cognitive Learning Theories (3)
   8. EP 649 Internship (9)

III. Assessment (27 credit hours)
   1. EP 517 Direct Assessment and Intervention for Academic Skill Deficits (3)
   2. CECP 525 Formal Measurement in Education and Counseling (3)
   3. EP 541 Psychoeducational Assessment (3)
   4. EP 542 Practicum in Psychoeducational Assessment (3)
   5. EP 541 Psychoeducational Assessment (3)
   6. EP 542 Practicum in Psychoeducational Assessment (3)
   7. EP 649 Internship (9)

IV. Research and Statistics (37-41 credit hours)
   1. STAT 531 Survey of Statistical Methods I (3)
   2. STAT 532 Survey of Statistical Methods II (3) OR ITCE 561 Educational Statistics (3)
   3. EP 505 Quasi-Experimental and Single Subject Design Research (3)
   4. EP 655 Research in Psychoeducational Studies (4-8)
   5. EP 600 Dissertation (24)

V. Psychoeducational Core (48 credit hours)
   1. SE 470 Psychology of the Exceptional Child (3)
   2. PSYCH 420/565 History and Systems of Psychology (3)
   3. CECP 570 Cross Cultural Counseling: Theory and Research (3)
   4. PSYCH 461/561 Physiological Psychology (3)
   5. EP 690 Psychopathology of Childhood (3)
   6. EP 510 Psychological Theories of Human Development Applied to Education (3)
   7. EP 650 Professional Practice in School Psychology (9)
   8. EP 649 Internship (9)
   9. Family Studies Option (3)
   10. Curricula-Instruction Option (3)
   11. Social Basis of Behavior Option (3)

VI. Field and practica experiences by semester

Years 1-4
Research in the schools or with children (75 hrs.),
EP 655 Research in Psychoeducational Studies (4-8)

First Year, Fall and Spring:
Knowledge, roles and functions (75 hrs.)
Second Year, Fall:
Introduction to consultation and intervention practices (50 hrs.)
EP 650 Professional Practice in School Psychology (9)
Third Year, Fall and Spring:
Practice professional assessment skills (e.g., admin., inter., rept. writ.-75 hrs./sem.)
EP 542 Practicum in Assessment

Total: 425 hours structured field experience

Year 4, Fall and Spring
Student developed plan (50-100 hrs)
EP 650 Professional Practice in School Psychology (3)

Total: 475 supervised field experience hours prior to internship
Counselor Education

GRADUATE COURSES

410 Gender Role Development: Implications for Education and Counseling (3) Theories and research of gender roles and their relevance to identity and behavior in socio-psychological, educational, and counseling settings. (Same as Women’s Studies 410.)

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and other social institutions.

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

502 Registration for Use of Facilities (1-15) 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.


504 Special Topics (1-3) Instructor-initiated course offered at convenience of academic unit on topics of current interest. May be repeated. Maximum 15 hrs. S/NC or letter grade.

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

525 Formal Measurement in Education and Counseling (3) Principles of test construction and item analysis. Survey of standardized tests of intelligence, achievement, aptitude, vocational interest, attitudes and personality. Prereq: 520 or equivalent.

535 Ethical, Legal, and Professional Issues in Counseling (3) Professional practice issues in school and community counseling and related fields: education, research, standards of practice, credentialing, and policy. Prereq: Admission to counseling program or consent of instructor.

550 Introduction to Pupil Personnel Programs (3) Historical, philosophy, professional standards, counselor role in relation to school staff and mental health professionals, and ethics of profession.

551 Theory and Practice of Counseling (3) Philosophical bases of helping relationships; development of counselor and client self-awareness; counseling theory and techniques.

552 Career Development: Vocational Theory, Research and Practice (3) Relationship of vocational theory, career development research and societal factors to life career roles.

553 Career and Educational Information Systems and Resources (3) Use of print and non-print materials: computer-based systems, for career and educational planning. Prereq: 552 or consent of instructor and Internet access account.

554 Group Dynamics and Methods (3) Theory and types of groups, descriptions of group practices, methods, dynamics, and facilitative skills, supervision of leadership skills. (Same as Psychology 567.)

555 Practicum in Counseling (3) Supervised practice and application of counseling skills with individual clients. Prereq: Admission to program, 431, 525, 551 and consent of instructor. May be repeated. Maximum 9 hrs. (Same as Psychology 559.)

556 Orientation to Mental Health Counseling (3) Mental health counseling as profession: professional organizations, legal and ethical issues, role identity.

557 Internship in Mental Health Counseling (1-6) Supervised postpracticum employment at academic unit approved site. Prereq: 550 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

561 Development and Operation of School Counseling Programs (3) Management of comprehensive school counseling programs to include needs assessment program goals, resource identification, evaluation, and use of computer-based program management software. Prereq: 550.

565 Facilitation of Technical Task Groups (3) Theory and application of group dynamics in context of technical task groups. Application of counseling techniques to facilitation of workplace teams. Prereq: 551, 554, or consent of instructor.

566 Approaches to Family Intervention and Counseling (3) (Same as Child and Family Studies 566.)

570 Cross-Cultural Counseling: Theory and Research (3) Theory and research on issues and problems in counseling of clients from different cultural backgrounds in U.S. and abroad. (Same as Psychology 574.)

580 Case Management Process in Mental Health Counseling (3) Introduction and application of knowledge and skills of the case management process: assessment, planning, and service provision. Consent of instructor.

585 Seminar in Gerontology (1) (Same as Educational Psychology 585; Exercise Science 585; Health 585; Nursing 585; Public Health 585; Social Work 585; Sociology 585.)

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

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

602 Directed Research (1-3) Instructor- or student-initiated group investigation of empirical and theoretical problems in educational and counseling psychology. May be repeated. Maximum 12 hrs. S/NC only.

604 Special Topics (1-3) Instructor-initiated courses offered at convenience of academic unit on topics of current interest. May be repeated. Maximum 15 hrs. S/NC or letter grade.

625 Advanced Study in Personality (3) (Same as Psychology 625.)

635 Ethical, Legal, and Professional Issues in Psychology (3) (Same as Psychology 635 and Educational Psychology 635.)

650 Seminar in Counselor Education (3) Professional issues related to role and function of counselor educator. Prereq: Admission to doctoral program in counselor education. May be repeated. Maximum 2 hrs. S/NC only.

655 Practicum in Counselor Education (3) Supervised practice and application of counseling skills with clients. Prereq: Admission to counselor education program and consent of instructor. May be repeated. Maximum 6 hrs.

660 Advanced Theory and Practice of Counseling (3) In-depth exploration of theories of human nature and the practice of counseling. Prereq: Admission to the Ph.D. program or permission of instructor.

665 Group and Systems Theory and Interventions (3) Exploration of group theory and family systems theory preparation as practitioners in facilitation of counseling and task groups, and examination of counseling and psychotherapy interventions applicable to group dynamics. Prereq: Admission to the Ph.D. program or permission of instructor.

670 Theory and Practice of Counseling Supervision and Consultation (3) Theory of counseling supervision and consultation, supervision of entry-level counselors, and agency consultation. Prereq: Admission to the Ph.D. program or permission of instructor.

671 Personality and Vocational Assessment (3) (Same as Psychology 667.)

675 Theory and Practice of University Teaching In Counselor Education (3) Emphasis on teaching and learning theories and classroom applications in the preparation of future mental health, school, and rehabilitation counselors. Prereq: Admission to the Ph.D. program or permission of instructor.

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

Educational Psychology

GRADUATE COURSES

432 The Disadvantaged Student: Psychoeducational Perspectives (3) Theory and research regarding etiology, psychosocial behavior and appropriate interventions.

460 Self-Management in the Helping Professions (3) Applications of self-management strategies to career, social, emotional, and mental health domains for both helping professional and their clientele. Prereq: Introductory course in psychology or consent of instructor. S/NC or letter grade.

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

502 Registration for Use of Facilities (1-15) 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.


504 Special Topics (1-3) Instructor-initiated course offered at convenience of unit on topics of current interest. May be repeated. Maximum 15 hrs. S/NC or letter grade.

505 Quasi-Experimental and Single-Subject Design Research (3) History, theory and research design techniques used to examine cause and effect relationships during applied psychoeducational research. Focus on controlling threats to internal validity through research design.

509 Internship in Adult Education (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

510 Psychological Theories of Human Development Applied to Education (3) Theory and research on emotional, social, and intellectual development over life span with applications to educational and therapeutic settings.

513 Reflective Practice in Education and Psychology (3) Concepts, theories and processes of reflective practice applied to educational settings.

514 Individual Study in Adult Education (3) Prereq: Consent of supervising instructor. Approval form must be completed in office of unit head. May be repeated. Maximum 6 hrs.

515 Educational Applications of Behavioral Theories of Learning (3) Behavioral theories and research, conditioning, observational learning, and ethological learning as systems applied to student motivation, discipline and learning.

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social learning, attribution and information processing as applied to education.

517 Direct Assessment and Interventions for Academic Skills Deficits (3) Theory, techniques and procedures shown to prevent and remediate academic skills deficits: curriculum-based assessment and direct intervention procedures.

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

520 Survey of Adult Education (3) Historical development, philosophies of adult education agencies, associations, programs, issues, and literature illustrating process of adult education and diversity of continuing education. Prereq: Consent of instructor.
521 Program Development and Operation in Adult Education (3) Theories and methods from research to practice in planning and operating adult education programs. Prereq: Consent of instructor.

522 Adult Development (3) Theory and research in adult development over lifespan and its implications for adult learning in formal and informal contexts.

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor.

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 520 or equivalent.

525 Characteristics of Adult Learners (3) Key characteristics of adult learners, current theory and research on adult learning, and implications for teaching and learning concepts.


527 Controversies in Adult Education (3) Controversies in adult education: development of critical analysis skills by looking at controversies from different perspectives.

528 Psychology of Aging (3) Theory and research of aging and gerontology related issues: psychological and related physiological changes that occur in latter life stages of human development. Implications for treatment programs and policy.

529 Facilitating Adult Learning (3) Theory, research, and practice related to working with adults in teaching-learning situations.

530 Methods of Collaborative Inquiry (3) Philosophical and theoretical frameworks for designing and conducting collaborative inquiry projects. Practice in conducting research.

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of history and current issues in school psychology.

541 Psychoeducational Assessment (3) Direct, psychometric and naturalistic assessment methods in learning situations. Prereq: Admission to school psychology program or consent of instructor, and Counselor Education and Counseling Psychology 525 or equivalent. May be repeated. Maximum 6 hrs.

542 Practicum in Psychoeducational Assessment (3) Application of assessment skills to clients in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

545 Psychoeducational Consultation (3) Use of two and three-person models of consultation in educational and therapeutic settings based on behavioral, ecological, social learning and cognitive-behavioral theories.

546 Practicum in Consultation (3) Application of consulting skills to educational settings. Prereq: 545.

549 Internship in School Psychology (1-6) Supervised, full-credit approved school psychology internship sites. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

550 Statistics and Research Design: Conceptual (3) Concepts, methods, treatment of statistics, research design, and quantitative basis of testing

560 Discipline and Conflict Resolution (3) Applications of major models of discipline and conflict resolution strategies in development of constructive atmosphere for classroom learning.

572 Cognitive Education: Models and Approaches (3) Models and approaches in field of cognitive education: research and theoretical support for various program components, critical variables of organizational learning that affect success of implementation.

573 Meeting Needs of Nontraditional and Underachieving Learners (3) Exploration of students' needs at any age and level of functioning who are not progressing up to their fullest potential. Causes of academic and motivational problems, and approaches to overcome them. Learning to learn, cultural alienation, and personal world view and interaction with effective teaching and learning.

574 Facilitating Group Change (3) Practical issues of group change. Analyses of group and individual experiences in all types of educational settings in relation to systems theory and collaborative learning theory. Needs of individuals and groups involved in change and roles of inside and outside change agents.

585 Seminar in Gerontology (1) (Same as Counseling Education 585; Exercise Science 585; Health 585; Nursing 585; Public Health 585; Social Work 585; Sociology 585.)

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

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

602 Directed Research (1-3) Instructor- or student-initiated group investigation of empirical and theoretical problems in education and counseling psychology. May be repeated. Maximum 12 hrs. S/NC only.

604 Special Topics (1-3) Instructor-initiated courses offered at convenience of unit on topics of interest. May be repeated. Maximum 15 hrs. S/NC or letter grade.

609 Advanced Seminar in Curriculum and Learning (3) Team- taught seminar on trends, themes, and issues in curriculum and learning. Reading and discussions based on significant research and scholarly publications.

612 Modes of Inquiry (3) (Same as Educational Psychology and Policy Studies 612.)

620 Seminar in Adult Education (3) Issues in adult education, theories and concepts, philosophical positions, research trends and methodologies. Prereq: 520 or equivalent.

621 Advanced Seminar in Program Planning (3) Concepts, principles, and theories related to program planning in adult education. Prereq: 521 or equivalent.

622 Advanced Seminar in Adult Development and Learning (3) Adult development and adult learning theory and research. Prereq: 522, 525, or equivalent.

630 Doctoral Seminar in Collaborative Learning (3) Issues, theories, concepts and research in collaborative learning. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 12 hrs. S/NC or letter grade.

635 Ethical, Legal, and Professional Issues in Psychology (3) (Same as Psychology 635 and Counselor Education and Counseling Psychology 635.)

640 Seminar in Applied Educational Psychology (2) Issues, theories, concepts and research in applied educational psychology. Prereq: Admission to Ph.D. in Education, May be repeated. Maximum 12 hrs. S/NC only.

649 Advanced Internship in School Psychology (1-9) Supervised experience as school psychologist in one approved internship site for doctoral level students. Prereq: Enrollment in doctoral level school psychology program and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

650 Professional Practice in School Psychology (1) Field setting to facilitate academic, social and interpersonal development of children and adults. School and mental health settings for intervention, consultation, prevention, and assessment services. May be repeated. Maximum 9 hrs. S/NC only.

655 Research in Psychoeducational Studies (1) Data analyses, collection, and interpretation. May be repeated. Maximum 9 hrs. S/NC only.


663 Scale Construction (3) Development, pilot testing, and revision of attitude inventories, rating scales, and other paper-and-pencil techniques for assessing beliefs, personality characteristics, and opinion. Prereq: Counselor Education and Counseling Psychology 525, and two-course sequence in statistical analysis.

665 Analysis of Research in Instructional Technology (3) Research on human learning, design of mediated learning environments. Analysis of teacher behavior, test development, computer software design and video presentations.

668 Practicum in Instructional Planning (3) Development and management of course or program of instruction in educational psychology. Prereq: 665, or consent of instructor.

669 Internship in Educational Psychology (1-6) Supervised employment in unit approved educational psychology internship sites. May be repeated. Maximum 12 hrs. S/NC only.

671 Mediated Learning Theory (3) Feuerstein's theory of mediated learning experience and its connections to work of Piaget, Vygotsky and others. Prereq: 669. Implications for transformational learning and building of learning communities for learners of all ages. Prereq: Admission to doctoral program or consent of instructor.

673 Collaborative Learning (3) Theories of collaborative learning and research related to facilitating collaborative learning in professional practice settings. Prereq: 513 and 671 or consent of instructor.

690 Psychopathology of Childhood (3) Descriptive and critical study of psychopathology of childhood and of systems of nomenclature applied to individuals with mental disorders; nomenclature provided in State Department of Education’s Student Evaluation Manual and Diagnostic and Statistical Manual of Mental Disorders of American Psychiatric Association.

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

Rehabilitation Counselor Education

GRADUATE COURSES

530 Orientation to Rehabilitation (3) History, philosophy, legal and economic bases, current issues, and practices in public and private rehabilitation programs and agencies, private rehabilitation companies, and public or private rehabilitation facilities. Analysis of appropriate industrial management models related to rehabilitation programs.

532 CaseLOAD Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in Federal-State vocational rehabilitation agencies, private rehabilitation companies, and public or private rehabilitation facilities. Analysis of appropriate industrial management models related to rehabilitation programs.

533 Job Analysis, Development, and Placement (3) Determining employment-readiness of people with disabilities, identifying appropriate jobs for selected clients, and assisting clients in seeking, obtaining, and retaining employment. Job analysis, job modification and re-engineering, marketing, and employer-serving techniques; legislation impacting job placement; supported work; and use of occupational information.

537 Vocational Evaluation: Clinical Methods (3) Procedures, and techniques used to assess individuals in determination and understanding their own work behavior and vocational potential. Selection and use of occupational exploration programs and work samples; application of situational tasks, job tryouts, and simulated work experiences in vocational evaluation. Clinical interpretation of data through formal staff conference, vocational counseling, and report writing.
538 Disability Management (3) Return-to-work issues in disability management programs: early intervention, quality services, and cost containment; standards and procedures for rehabilitation counselors; case managers in private sector rehabilitation.

541 Psychosocial Aspects of Disability (3) Psycho-social impact of disability on person and family. Reaction to loss, coping with disability, and societal rehabilitation.

543 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disabling conditions served by special education and rehabilitation personnel. Restrictive measures to eliminate or minimize resulting handicaps. Skills necessary to communicate with lay and professional persons.

545 The Rehabilitation Interview (3) Interview as used in assessment and planning with people who have disabilities and vocational handicaps.

547 Practicum in Rehabilitation (3) Supervised experience in area of rehabilitation; application of concepts, principles, and skills. Prereq: Consent of instructor.

549 Internship in Rehabilitation Counseling (12) Practicum experience in rehabilitation counseling. Full time clinical experience for second-year students (600 clock hrs required).

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

592 Assistive Technology in Rehabilitation (3) Technology as applied to needs of school age and post-secondary age students/clients. Delivery of assistive technology services; software programs and assistive devices; delivery systems, interdisciplinary evaluation/planning, and funding issues.

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

Electrical and Computer Engineering

(College of Engineering)

MAJOR DEGREES

Electrical Engineering ............... M.S., Ph.D.

Samir El-Ghazaly, Head

Professors:
Abidi, Mongi A., Ph.D. .............. Tennessee
Birdwell, J. Douglas, Ph.D. .......... MIT
Bomar, Bruce W. (UTSI), Ph.D. ..... Tennessee
Bouldin, Donald W., Ph.D. ........... Vanderbilt
Lawler, J. S., Ph.D. ................. Michigan State
Pace, Marshall O. (Liaisos), PE, Ph.D. .......... Georgia Tech
Roth, J. Reece, Ph.D. ............... Cornell

Associate Professors:
Cirilli, Paul B., Ph.D. ............. New Mexico State
Islam, Syed, Ph.D. ................. Connecticut
Koch, Daniel, Ph.D. ............... Missouri (Rolla)
Kong, Seong-Gen, Ph.D. .......... Southern Calif
Smith, L. Montgomery (UTSI), Ph.D. .......... Tennessee

Assistant Professors:
Chiasson, John, Ph.D. ............... Minnesota
Howlader, Mostofa, Ph.D. ........... Virginia Tech
Peterson, Gregory, Ph.D. .......... Washington (St. Louis)
Qi, Hairong, Ph.D. ................. NC State
Smith, Philip W. ....................... Virginia
Tolbert, Leon, Ph.D. ............... Georgia Tech

Emeriti Faculty:
Alexeff, Igor, Ph.D. ............... Wisconsin
Bodnower, Martha E., Ph.D. .... Northwestern
Bose, Bimal K., Ph.D. ............... Calcutta
Gonzalez, R. C., Ph.D. ............. Florida
Green, Walter L., Ph.D. ........... Texas A & M

The Department of Electrical and Computer Engineering offers graduate degrees leading to the Master of Science and a Doctor of Philosophy with a major in Electrical Engineering. Graduate students are able to conduct research in a wide variety of electrical engineering areas including communication, computer engineering, computer vision and robotics, electromagnetics, electro-optics, image processing, information processing, intelligent control, microelectronics, mixed-signal VLSI, monolithic sensors, plasma engineering, power electronics and systems, sensor fusion, and signal processing.

The department sustains a strong joint program in mixed-signal VLSI and monolithic sensors with the Oak Ridge National Laboratory, Instrumentation and Controls Division. This program provides students with unique opportunities to receive career-related training at ORNL while satisfying thesis or dissertation requirements of the graduate program. Departmental graduate programs are also available at the Space Institute, Tullahoma. Further information about these various programs is available from the department.

The Departmental Graduate Committee is responsible for administering, promoting, and advancing the general well-being of the graduate program. Departmental actions regarding a graduate student may be appealed in writing, first to the departmental graduate committee and then to the department faculty.

THE MASTER'S PROGRAM

Graduate work leading to the Master of Science with a major in Electrical Engineering may be completed during one academic year of full-time study, or two to three years of part-time study.

Admission Requirements

Applicants for admission to the M.S. degree program are expected to have completed a bachelor's degree in Electrical Engineering with an average of at least 3.0 out of 4.0 both overall and in the senior year. All applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must score at least 550 on the TOEFL exam to be considered for admission to the program.

Students who hold the bachelor's degree in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. The department will require that selected undergraduate courses be taken to make the background of these students comparable to that of students who hold a bachelor's degree in Electrical Engineering. These undergraduate courses may include electrical engineering courses from the sophomore and junior years and one senior electrical engineering sequence of the student's choice. The specific set of undergraduate courses required will be chosen in view of the applicant's prior education and experience. The student will be admitted under non-degree status until the required undergraduate courses are successfully completed with a 3.0 average.

Master's Degree Requirements

Students may choose between a thesis option and a project (non-thesis) option M.S. program. All students must file a Master's Program Plan with the departmental graduate committee specifying which option they have selected, a semester-by-semester schedule of the courses they intend to take, and the members of the student's master's committee. Students may change between the thesis and project options, one time, by filing an amended Master's Program Plan.

Thesis Option: Specific requirements of the thesis option are a minimum of 30 semester hours including:

1. Electrical Engineering 503 and 504.
2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.
3. An additional 12 semester hours of 500-level work in electrical engineering including 6 semester hours in the student's major area of electrical engineering and 6 semester hours in a second area of electrical engineering approved by the student's master's committee.
5. A final oral examination covering the thesis and related coursework.

Non-Thesis Option: Specific requirements of the project (non-thesis) option are a minimum of 33 semester hours including:

1. Electrical Engineering 503 and 504.
2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.
3. An additional 18 semester hours of 500-level work in electrical engineering courses, with at least 6 hours of 500-level work in each of two areas of electrical engineering.
4. Electrical Engineering 501 (project in lieu of thesis) with a minimum grade of B. This course will be administered by the student's master's committee. A written project proposal describing what the student will do in the course must be submitted in advance for the graduate committee's approval. A written final report and oral presentation is required and one copy of the final draft must be submitted to the graduate committee.
5. A final written and oral examination covering the project and related coursework.