
5315 Watercolor IV (4) Individual concepts of personal expression with varied water-based media in paper. Prereq: 12 hrs 3315 for art majors; consent of instructor. May be repeated. Maximum 12 hrs. E

4406 Special Topics in Sculpture (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4415 Sculpture IV (4) Individual development of sculptural problems and techniques. May be repeated. Maximum 12 hrs.

4470 Wood Design: Advanced Practical Construction (4) Application of lamination, carving and joining techniques in designing and construction of contemporary furniture. Prereq: 2450 or consent of instructor. May be repeated. Maximum 12 hrs.

5406 Special Topics in Communication Design (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

5415 Intaglio IV (4) Photographic, collage techniques, combine printing with other print media. May be repeated. Maximum 12 hrs. F, W, Sp


5417 Screen Printing (4) Traditional hand cut and photographic stencils; combine printing on paper and other surfaces. May be repeated. Maximum 12 hrs. F, W, Sp

5455 Visual Communications Seminar (2) Political, social, economic and ethical problems of contemporary designer. Sessions with outside guest speakers and field trips. Prereq: 4515. W

4606 Special Topics in Printmaking (4) Student or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4615 Intaglio IV (4) Photographic, collage techniques, combine printing with other print media. May be repeated. Maximum 12 hrs. F, W, Sp


4617 Screen Printing (4) Traditional hand cut and photographic stencils; combine printing on paper and other surfaces. May be repeated. Maximum 12 hrs. F, W, Sp

4655 Special Topics in Metal Design (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4665 Special Topics in Metal Design (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.


4855 Studies in Art History (3) Concentration in selected areas. Prereq: 16 hrs of art history and consent of instructor. May be repeated. Maximum 6 hrs.

4856 Special Topics in Ceramics (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.


4970 Glass Calculation (4) Prereq: Senior or graduate standing and consent of instructor. W

4971 Kiln Construction (4) Prereq: Senior or graduate standing and consent of instructor. Sp

5000 Thesis (1-15) E

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

5011-21-31 Exhibition in Lieu of Thesis (3, 3, 3)

5101 Foreign Study (1-12) See page 97.

5102 Off-campus Study (1-12) See page 97.

5103 Independent Study (1-12) See page 97.

5115 Graduate Drawing I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5125 Graduate Drawing II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5215 Graduate Painting I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5225 Graduate Painting II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5255 Graduate Fiber and Fabrics I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5275 Graduate Fiber and Fabrics II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5315 Graduate Watercolor I (2-6) Maximum 18 hrs. F, W, Sp

5325 Graduate Watercolor II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5415 Graduate Sculpture I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5425 Graduate Sculpture II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5515 Graduate Communication Design I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5525 Graduate Communication Design II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5615 Graduate Printmaking-Lithography I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5616 Graduate Printmaking-Intaglio I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5617 Graduate Printmaking-Screen Printing I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5625 Graduate Printmaking-Lithography II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5626 Graduate Printmaking-Intaglio II (2-6) Individual problems with etching and engraving. May be repeated. Maximum 18 hrs. F, W, Sp

5627 Graduate Printmaking-Screen Printing II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5795 Reading and Research in Art History (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5770 Seminar in Art History (4) A

5900 Seminar in Art Criticism (4) Theory and practice. Intended for majors in studio art. A

5955 Graduate Ceramics I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5975 Graduate Ceramics II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5999 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by the graduate faculty. May be repeated. Maximum 30 hrs. E

*Graduate II courses must be preceded by successful first year evaluation by the faculty.

Courses offered periodically only at the Phi Beta Pi Arrowmont School of Crafts, Gatlinburg, Tennessee. Courses may be repeated.

4004 Special Topics (1-4) Student- or instructor-initiated course offered at convenience of department. May be repeated.

4104 Drawing (1-4) Intermediate to advanced.

4204 Painting (1-4) Intermediate to advanced.

4254 Fiber Processes (1-4) Intermediate to advanced.

4264 Fiber Construction (1-4) Intermediate to advanced.

4274 Fabric Surface Design (1-4) Intermediate to advanced.

4284 Fabric Constructions (1-4) Intermediate to advanced.

4304 Watercolor (1-4) Intermediate to advanced.

4404 Sculpture (1-4) Intermediate to advanced.

4504 Communication Design (1-4) Intermediate to advanced.

4604 Printmaking (1-4) Intermediate to advanced.

4654 Metal Design (1-4) Intermediate to advanced.

4664 Enameling (1-4) Intermediate to advanced.

4904 Photography (1-4) Intermediate to advanced.

4954 Ceramics (1-4) Intermediate to advanced.

Audiology and Speech Pathology

MAJORS

DEGREES

Audiology

M.A.

Ph.D.

Ph.D.

Speech and Hearing Science

M.A.

Speech Pathology

M.A.

Ph.D.

Audiology

Ph.D.

Professors:

H. L. Luper (Chair), Ph.D. Ohio State; S. Adler, Ph.D. Ohio State; C. W. Asp, Ph.D. Ohio State; P. J. Carney, Ph.D. Iowa; D. M. Lipscomb, Ph.D. Washington; I. Nabelek, Sc.D. Prague; H. A. Peterson, Ph.D. Illinois; B. Silverstein, Ph.D. Pennsylvania

Associate Professors:

S. B. Burchfield, Ph.D. Michigan State; C. G. Mai, M.Ed. Texas

Assistant Professors:

A. G. Diefendorf, Ph.D. Washington; E. Hamby, Ph.D. Iowa; C. J. Farrell, M.A. Tennessee

THE MASTER'S PROGRAM

A major is offered in Audiology or in Speech Pathology. A minor is offered in each of the two areas when approved by the department. The intent of each major program is to provide the student with the scholarly and professional skills necessary for functioning as an independent professional clinician in any clinical environment. Within this broad coverage of speech pathology or audiology, it is possible for a student to specialize to some extent. For example, in the M.A. in Audiology program, a student may emphasize audiological assessment, eurhabilitation-rehabilitation, medical or pediatric, or industrial audiology. Within the M.A. in the Speech Pathology program, a student may emphasize language disorders, cultural language differences, or speech disorders such as aphasia or stuttering. Students interested in specializing beyond the typical broad M.A. program should consult the department office or their advisor for lists of suggested courses, practica and independent studies.

Students majoring in the two areas are expected to complete the academic requirements for clinical certification from the American Speech and Hearing Association, including the required number of clock hours of clinical practicum. An exception to this rule must be approved by the Department Curriculum Committee. Enrollment in clinical
practicum courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient course work in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students may elect either the thesis program or the non-thesis option. Students in both programs are required to take 5110 and 5115. The Master's program in hearing science will include a minimum of 45 quarter hours of approved graduate credit, including 9 quarter hours of 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least one-half of these total courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. A minimum of 24 quarter hours must be at the 5000 or 6000 level. The decision as to choice of the thesis or non-thesis program is normally made following completion of 5110 and a conference with the student's advisor.

THE DOCTORAL PROGRAM

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for research or college teaching careers in the field of speech and language pathology, audiology, or speech and hearing science. This degree program is research oriented, with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study independent work, and a final oral examination. The program will normally consist of three or more calendar years of graduate study beyond the Master's degree with the first year being devoted primarily to formal course work and the last year to full-time research culminating in the doctoral dissertation. Specific programs of study will be determined by the student in consultation with his/her faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philosophy in Speech and Hearing Science will include:

1. Successful completion of course work in the study of one or more research tools, or other specific scientific methodological vehicles pertinent to the research interests of the candidate. The choice of research tool(s) is subject to departmental approval.

2. A minimum of 9 quarter hours of graduate credit obtained in course work in a cognate field outside the Department of Audiology and Speech Pathology. These hours are in addition to those required in item 1 above.

3. Sufficient course work within the department but outside the area of specialization to give a broad foundation and understanding.

4. A comprehensive examination to demonstrate a general knowledge of the basis of audiology, speech and language pathology, and speech and hearing science; advanced knowledge of the specifics of the area of specialization.

5. Research and dissertation to give at least 36 hours of graduate credit (6000 level).

6. A final oral examination.

4040 Appraisal of Speech and Language Disorders (4) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Prereq: 3040, 3050, or consent of instructor. (Same as Special Education 4040). F, Sp

4070 Free Association (4) Oral and written free association as process for diagnosing and treating communication disorders. Includes didactic self-analysis. W

4190 Speech Development of the Hearing Impaired (3) (Same as Special Education 4190)

4200 Practicum in Speech Development of the Hearing Impaired (3) (Same as Special Education 4200)

4210-20 Language Development of the Hearing Impaired I, II (3, 3) (Same as Special Education 4210-20)

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) (Same as Special Education 4250)

4310 Stuttering (3) Nature and treatment. Review and integration of various theories. Prereq: 3040 or consent of instructor. (Same as Special Education 4310). F, Su

4320 Introduction to Clinical Practice in Speech Pathology (3) Prereq: 3040, 3050, 3310, 4040, and consent of instructor. (Same as Special Education 4320). S/NC only. W

4330 Clinical Practice in Speech Pathology (1-6) Prereq: 4320 and consent of instructor. (Same as Special Education 4330). S/NC only. E

4340 Clinical Practice in Speech Pathology (1-6) Prereq: 4330 and consent of instructor. (Same as Special Education 4340). May be repeated. S/NC only. E

4400 Voice Disorders (4) Etiology, diagnosis, and treatment of organic and functional voice disorders. Prereq: 10, 3065, or consent of instructor. (Same as Special Education 4400)

4450 Clinical Practice in Audiology (1-6) Prereq: 4720 and 4930. E

4460 Clinical Practice in Audiology (1-6) Prereq: 4450, 4720 and 4930. E

4470 Clinical Practice in Audiology (1-6) Prereq: 4460, 4720, 4930. May be repeated. Maximum 9 hrs. E

4520 Speech Pathology (3) Independent study of special problems in speech pathology. Prereq: Consent of instructor. E

4550 Problems in Speech Pathology (1-6) Prereq: Consent of instructor. E

4560 Problems in Audiology (1-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E


4620 Birth Defect Syndromes and Language Retardation (3) Examination of research literature relevant to birth defects and language retardation including clinical, educational and socioemotional implications of such disorders. Prereq: 4610 or consent of instructor. F

4630 Practical Applications of Language Habilitation Techniques (4) Discussion and demonstration of various methods and procedures used in treating language retarded children. Prereq: 4610 or consent of instructor. W

4640 Parent Participation in Language Habilitation Programs (3) Nature of counseling and educational relationships with parents of exceptional children including emotional support for families, behavior management strategies, home training methods. Prereq: 4610 or consent of instructor. Sp

4650 Speech and Language of the Culturally Different Child (3) Discussion of speech and language differences of children of different minority groups, of different ethnic and class membership and from different geographic regions; their causes, and their effects upon educational programs. F, W, Su

4680 Topics in Language Retardation and Its Habilitation (3) Lectures on selected topics by representatives of such fields as special education, early childhood education, educational psychology, genetics, and psychology. Prereq: 4610 or consent of instructor. Su


4930 Aural Rehabilitation: Speechreading and Auditory Training (2) Rehabilitation of acoustically impaired by maximizing use of residual hearing and utilizing speechreading as receptive communicative process. Prereq: 4720. (Same as Special Education 4930). F, W, Su

4940 Introduction to the Verbo-Tonal System (4) Prereq: 3710 or 4700. Recommended prereq: 4930 and 3050. (Same as Special Education 4940). F, W, Su

5000 Thesis (1-15) E

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

5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: 4490 and 4930. May be repeated. Maximum 12 hrs. (Same as Special Education 5040). E

5045 Practicum in Hearing Aid Orientation and Communication Counseling (1-8) Practical exposure to counseling hard of hearing and family members concerning use and expectations of hearing aids, suggestions for better use of communication skills. Prereq: 4720, 4650, and consent of instructor. May be repeated. Maximum 6 hrs. E

5050 Practicum in Verbo-Tonal Habilitation I (1-6) Prereq: 4940, 5950, or consent of instructor. May be repeated. Maximum 9 hrs. E

5051 Practicum in Aural Rehabilitation I (1-6) Prereq: 4720 and 4830. May be repeated. Maximum 9 hrs. E

5060 Anatomy and Physiology of Speech (3) Structure and function of neuromuscular system involving phonation, respiration, swallowing, and articulation. Prereq: 3065. F, W

5070 Anatomy and Physiology of Hearing (3) Structure of human ear, pathology of hearing impairment, and psychoacoustics of audition. Prereq: 3710. F
5071 Physiological Acoustics and Audiology (3) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by ear, distortion in ear, and ear as analytic mechanism. Prereq: 4720, 5070 or consent of instructor. W, Su
5100 Comparative Anatomy of the Peripheral Auditory Structures (3) Tutorial laboratory course in comparative anatomy of temporal bone employing microscopic dissection techniques. Prereq: 5070 or consent of instructor. E
5110 Introduction to Research in Speech and Hearing Sciences (3) Analytical research techniques, research design, instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 4720. F
5470 Impedance Measurement in Audiology (2) Theoretical considerations behind emergence of impedance measurement in clinical measurement of hearing. Practical experience in using several impedance measuring devices. Prereq: 4720 and 5070. W
5490 Practicum in Hearing Conservation (1-6) Supervised on-site work in hearing conservation programs at industrial settings. Prereq: 5040. May be repeated. Maximum 6 hrs. E
5500 Seminar in Audiology (3) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 16 hrs. F, Sp
5503 Special Auditory Tests (3) Theoretical and practical considerations of auditory procedures used for differentiating between cochlear vs. retrocochlear auditory lesions. Identifying central auditory lesions and nonorganic hearing loss. E
5505 Special Problems in Audiology (1-6) Prereq: 4720 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs. E
5520 Seminar in Speech Pathology (3) Significant current research in speech pathology. Topics vary from quarter to quarter. Prereq: 12 hrs in speech pathology. May be repeated with consent of department. Maximum 12 hrs. E
5540 Seminar in Language Pathology (3) Nature, etiology, and historical development of retarded language development in children. Prereq: 4610 (Same as Special Education 5540). W
5550 Special Problems in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
5560 Independent Study in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
5570 Management and Supervision for Speech-Language-Hearing Professionals (3) Management systems, accountability, personnel practices used clinical supervision. For audiologists and speech language pathologists interested in private practice, supervisory or administrative positions. E
5580 Independent Study in Audiology (1-6) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs. E
5590 Practicum: Language Pathology in Children (3) Seminars, discussions, and practical training. Includes discussion and utilization of testing tools and analyses of habituative philosophies, specialties and techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
5595 Seminar in Language Differences (3) Significant research relevant to language difference of culturally different children. Prereq: 4650. Su
5620 Psychoacoustics (3) Auditory reception and psychophysical measurement of speech and language pathologists interested in private practice, supervision or administrative positions. E
5680 Seminar in Speech Science (3) Advanced study of areas such as speech physiology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement of speech and language. Topics vary from quarter to quarter. Prereq: 6010 or consent of instructor. May be repeated. Maximum 9 hrs. Sp, W, A
6090 Seminar in Hearing Science (3) Advanced study of perception of nonspeech acoustic signals, detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 6020 or consent of instructor. May be repeated. Maximum 9 hrs. W, A
6110 Experimental Design in Speech and Hearing Science (3) Analysis of experimental design in theses and related journals. Psychophysical methods for data collection. Generation of experimental designs based on parametric and nonparametric statistics. Prereq: 5110 or equivalent and consent of instructor. S
6117 Theories of Hearing (3) Physiological process basic to classical theories of hearing related to sensitive, loudness, pitch, differential threshold, and frequency. Prereq: 5070 or consent of instructor. A
6119 Advanced Instrumentation in Speech and Hearing Science (3) Selection, use and calibration of instrumentation used in speech and hearing research. Prereq: 5117, 5119 or equivalent. Sp
6500 Advanced Seminar in Audiology (3) Prereq: Consent of instructor. May be repeated. Sp
6520 Advanced Seminar in Speech and Language (3) Topics vary from quarter to quarter but include advanced study of aberrations of voice, articulation, speech and language, language development or use, and language symbolism. Prereq: Consent of instructor. May be repeated. E
6560 Directed Research (1-6) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E
6570 Directed Study in Speech Pathology (1-3) May be repeated. Maximum 9 hrs. E
6580 Directed Study in Audiology (1-3) May be repeated. Maximum 9 hrs. E
6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 9 hrs. E
6600 Directed Study in Hearing Science (1-3) May be repeated. Maximum 9 hrs. E
biochemistry

MAJOR

Biochemistry

DEGREES

M.S., Ph.D.

professors:

W. D. Wicks (Head), Ph.D. Harvard; J. E. Churchich, Ph.D. Sheffield (England); J. G. Joshi, Ph.D. Poona (India); K. J. Koontz, Ph.D. Rochester (New York); E. E. Miller, Ph.D. Michigan State.

associate professor:

L. Huang, Ph.D. Michigan State.

Asst. professors:

L. B. Brattstein, Ph.D. Illinois; R. Bryant, Ph.D. Illinois; R. H. Faiberg, Ph.D. California (Berkeley); J. W. Koontz, Ph.D. Kentucky.

The graduate program involves successful completion of a series of graduate courses and seminars and a qualifying examination at the end of the first year. In addition, the M.S. degree requires research leading to the writing and oral defense of a thesis, while the Ph.D. degree requires successful completion of a comprehensive examination and an extensive research leading to the Ph.D. dissertation and its oral defense.

The qualifying examination: At the conclusion of the first year's work in 5510-20-30, 5310-20-30 and 4230, a comprehensive qualifying examination covering all of the material will be taken by all first year graduate students, without exception, in the first week of the summer quarter. On the basis of results of the examination, the student will be counseled concerning his/her future in the biochemistry program.

The master's program

This program requires about two years of full-time study and provides both breadth and depth of training by mixing classroom instruction with research laboratory experience. Students completing this program will have a sound foundation in modern biology and chemistry and will be equipped to follow and absorb future advances in these fields. Recent graduates of this program are now involved in such occupations as industrial pharmaceutical research, junior college and high school teaching, hospital laboratory work, cancer research, scientific journalism, and pursuit of Ph.D. degrees.

Candidates usually should offer course work covered by an undergraduate major in either biology or chemistry. Departmental requirements consist of the satisfactory completion of 45 credit hours of graduate work and the mastery of the subject matter of the following courses:

1. Introductory Organic Chemistry with laboratory (at least one year), at least one quarter of analytical chemistry, and a minimum of three quarters of approved physical chemistry.
2. A minimum of 12 quarter hours of approved biology courses beyond the Introductory level, including at least 3 hours of genetics and 3 hours of physiology.
3. Biochemistry 5510-20-30, 5310-20-30, 4230; and at least one special topics course (5430), or 5610 or 5110 or 5120 or 5130 or 5210.
4. A qualifying examination as described above.
5. At least 9 hours of advanced lectureships selected from the following: Biochemistry 6410, 6010.
6. At least 9 hours of Master's research and a thesis.
7. A final comprehensive examination which will cover both the thesis endeavor and the subject matter of the course requirements.

The doctoral program

An incoming student must present course work covered by an undergraduate major in either chemistry or biology. Departmental requirements for the awarding of the Ph.D. include mastery of the subject matter indicated in the following list of courses.

Course contents listed in items 1 and 3 are prerequisites to taking the comprehensive examination; applicants usually should expect to complete these requirements within the first two years of graduate school.

1. Introductory Organic Chemistry with laboratory (at least 1 year); at least one quarter of analytical chemistry, Chemistry 4510*, Introductory Physics*, Differential and Integral Calculus*; at least three quarters of approved graduate courses in chemistry or physics, for example:
   - 5110-20-30-35, Chemistry 5340, Physics 5210-20-30, Physics 5440, Physics 5510-20-30; plus minimum of three quarters of approved physical chemistry (Biochemistry 4210-20-30, or Chemistry 4910-20 and Biochemistry 4230, or Chemistry 3410-20-30) and at least 18 hours of biology beyond the introductory level including at least 3 hours of genetics and 3 hours of physiology. At least 3 hours must be graduate credit in an approved area of specialization which should be identified early so that necessary prerequisites can be taken.
   - Biochemistry 5610-20-30, 5310-20-30, 4230.
   - In addition to the courses listed in item 3 above, four courses selected from those numbered 5110 or higher, excluding 5300 or 5640.
2. Qualifying examination.
3. Participation in Biochemistry 6410 and in the advanced biochemistry seminars 6010 during the entire period of residence.
4. Comprehensive examination: Students who pass the comprehensive qualifying examination with sufficiently high marks and those who complete a mandatory M.S. degree (required prior to the comprehensive examination) will take the examination, at a time and of a format compatible with Graduate School requirements as determined by the student's committee.
5. A dissertation reporting the results of original and significant research carried out during the term of candidacy.
6. A final examination which will be conducted primarily with the student's dissertation.

Petitioning for Master's degree: Students who have passed the preliminary examination in the Ph.D. program may petition the department for award of a Master's degree. The additional requirements for such a degree shall be:
   a. The completion of at least 45 hours of approved course work for graduate credit, at least half of which must be at or above the 5000 level.
   b. The preparation of a research manuscript suitable for submission for publication in a major scientific journal;
   c. The oral defense of that manuscript before an examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department.

4110-20 Cellular and Comparative Biochemistry
(4, 4) Electrolyte behavior; chemistry and structure of proteins, enzymes, and biological function; caloribiosis and energy capture; synthetic metabolism; nucleic acid function, protein synthesis and biochemical genetics; regulation of biological processes. Must be taken in sequence. Prereq: Chemistry 3211-21-31, 3219-29-39, and 1 course from Biology 1210-20-30 or Botany 1110-20. 3 lectures and 3 discussions. F, W, Sp, W, Sp

4119 Cellular and Comparative Biochemistry Laboratory (2) Basic biochemical procedures of general application in biochemistry and molecular biology. Prereq or coreq: 4110. F, W, Sp

4210-20 Introduction to Physical Biochemistry
(3, 3) 4210—Introduction to thermodynamics; phase stability and phase change; chemical potential; osmotic pressure; activity and the Debye-Huckel model; electrochemistry; membrane permeability; 4220—Elements of statistical mechanics, diffusion; collision theory; chemical kinetics and transition state theory, higher order kinetics; specialized kinetics of enzymatic processes; some biopolymer considerations. Prereq: Mathematics 1840-40-60, Chemistry 3211-21-31 and 3219-29-39, and an introductory course in biology. F, W

4230 Introduction to Physical Biochemistry (3)
Physical characterization of macromolecules; polarized light, absorption and fluorescence, sedimentation and transport hydrodynamics; electrophoretic mobility, light scattering, and structural x-ray crystallography of proteins and nucleic acids. Prereq: 4220 or Chemistry 3430, or equivalent.

5000 Thesis (1-15) E

5010 Biochemical Techniques (2) Theory and laboratory practice in chromatographic and electrophoretic techniques in isolation and characterization of macromolecules of importance in biochemistry and molecular biology. Prereq: 4110 or equivalent. Open to undergraduates with consent of department.


5210 Biochemistry of Mitochondria and Selected Organelles (3) Overview of the metabolic systems in mitochondria and other cellular organelles. Supramolecular organization, biophysical interactions, transport systems, drug metabolism, oxygen toxicity and defense mechanisms, nitrogen fixation and photosynthesis. Emphasis on experimental approaches. Prereq: 4210 or 5610 or equivalent.

5300 Protein Structure and Enzyme Function (3) Physicochemical properties of proteins; primary, secondary, tertiary and quaternary structure; denaturation, renaturation and other conformational change; structure-function correlations; coenzymebound models of catalysis, drug metabolism, oxygen toxicity and defense mechanisms, nitrogen fixation and photosynthesis. Emphasis on experimental approaches. Prereq: 4210 or 5610 or equivalent.

5410 Biophysical Techniques (3) Overview of the metabolic systems in mitochondria and other cellular organelles. Supramolecular organization, biophysical interactions, transport systems, drug metabolism, oxygen toxicity and defense mechanisms, nitrogen fixation and photosynthesis. Emphasis on experimental approaches. Prereq: 4210 or 5610 or equivalent.
Botany

MAJOR

DEGREES

Botany

M.S., Ph.D.

Professors:

R. W. Holton (Head), Ph.D. Michigan;
E. C. Cleeth, Ph.D. Duke; H. H. DeSelm, Ph.D. Ohio State; A. M. Evans, Ph.D. Michigan;
W. R. Hamblin, Ph.D. Vanderbiit; L. W. Jones, Ph.D. Georgia;
J. F. Schmidt, Ph.D. Emory; F. H. Norris (Emeritus), Ph.D. Ohio State; J. S. Olson, Ph.D. Chicago;
R. J. Colditz, Ph.D. Columbia; A. J. Sharp (Emeritus), Ph.D. Ohio State; P. L. White, Ph.D. Texas.

Associate Professors:

C. C. Amundson, Ph.D. Colorado; J. D. Caponetti, Ph.D. Harvard; A. S. Heiman, Ph.D. Ohio State;
R. R. Hankel, Ph.D. Miami (Ohio); L. G. Hickok, Ph.D. Massachusetts; K. W. Hughes, Ph.D. Utah;
O. J. Schwartz, Ph.D. North Carolina State; H. H. Shugart, Ph.D. Georgia.

Assistant Professors:

B. Millin, Ph.D. North Carolina State; E. E. Schilling, Ph.D. Indiana; D. K. Smith, Ph.D. Tennessee;
W. O. Smith, Ph.D. Duke.

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, bryology, cytology, cytogenetics, ecology, genetics, lichenology, morphology, mycology, phytobiology, physiology, phytocology, and taxonomy.

Requirements for admission: In addition to the general Graduate School requirements (see page 10) the botany department also strongly recommends submitting aptitude and advanced scores from the Graduate Record Examination, at least three letters of recommendation from academic or professional persons, a short statement describing probable areas of interest in botany, and the following specific courses: (1) general botany or biology, 12 quarter hours; (2) advanced botany or closely allied biological sciences, 18 quarter hours; (3) physiological sciences; general inorganic chemistry, 12 quarter hours organic chemistry and physics highly recommended; (4) college mathematics, 9 quarter hours.

General degree requirements are given on pages 18-21. Special departmental requirements include successful completion of the following.

THE MASTER'S PROGRAM

A. Thesis Program

1. Satisfactory preparation of a written formulation and oral defense to the student's committee of a research proposal suitable for a thesis problem. Must be completed before enrollment in Botany 5000.

2. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030 (can also be applied to the doctoral program).

3. Satisfactory completion of 2 credit hours at the 6000 level.


5. Presentation of a thirty-minute departmental seminar.

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

B. Non-Thesis Program

1. Satisfactory completion of 51 quarter hours of approved graduate courses of which 30 quarter hours must be in botany including Botany 5003 and 5004.

2. Satisfactory completion of 2 credit hours at the 6000 level.

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

4. Satisfactory performance on a final written examination for all work offered for the degree. The department may or may not follow this examination with an oral examination.

THE DOCTORAL PROGRAM

1. Satisfactory presentation of a written formulation and oral defense to the student's committee of a research proposal suitable for a dissertation problem. Must be completed before enrollment in Botany 6000.

2. Satisfactory performance on a written comprehensive examination.

3. Presentation of one or more cognate areas outside of the department totaling 9 graduate credit hours with at least a B average.

4. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030.

5. Satisfactory completion of 6 credit hours at the 6000 level (excluding dissertation).


7. Presentation of a one-hour departmental seminar near the end of the doctoral program.

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

*Note: Graduate School requirements are denoted by an asterisk. These requirements should be interpreted as minimal requirements and specific stipulations or requirements such as additional foreign languages, additional oral preliminary examinations may be required by the individual student's faculty committee.

**3010-20 Plants in Evolution (4, 4) Monera to Eukaryota, emphasis on evolutionary relationships, morphology and development. Prereq: 4 hrs. in biological sciences. F, W

**3030 Field Botany (4) Study of plants in natural environments including plant identification, collection, preservation and basic ecological concepts. Prereq: 6 hrs. in biological sciences. F, W

**3031-32 Field Botany (4, 4) Emphasis on tall and winter flora respectively. Prereq: 3030. Need not be taken in sequence. W

**3050 Socioeconomic Impact of Plants (3) Significance of plants in origin and development of human cultures. Evol. of cultivated plants, and role of plants in present civilizations. Occasional field trips. Sp, Su

**3070 Genetics and Society (3) An introduction to genetics, anthropology and evolution with emphasis on their implications for human society. (Same as Anthropology 3070.) W, A

**3090 Biology and Human Affairs (3) Basic biological principles involved in deterioration and preservation of an environment in which human cultures may survive. F

**3210 Introductory Plant Physiology (4) Organismal physiology of plants; water relations, mineral nutrition, morphogenesis, elements of metabolic pro-
cesses, effects of age, light, natural rhythms, temperature, seasonal changes, and interaction with other species and with the overall environment. Lecture and lab. Prereq: 1 yr general chemistry and 1 yr biological science. F, Sp, Su

4017 Field Mycology (3) Field experience on identification of molds and mycorrhizal fungi. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A

4021 Field Bryology (3) Field experience on identification of mosses and liverworts. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A

4022 Field Lichenology (3) Field experience on identification of lichens. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A

4023 Field Agroecology (3) Field experience on identification of grasses. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A

4030 Mechanics of Plant Speciation (3) Processes of plant speciation emphasizing population genetics, biogeographic and environmental variation, populations, establishment of population barriers and other aspects of plant speciation. Prereq: 3010-20 and Biology 3110. W, A

4045 Aquatic Vascular Plants (3) Field experience on identification of aquatic vascular plants. Frequent field trips, field recognition of species and habitats. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A

4050 Synanthropology (3) Field experience on identification of composites. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A


4061 Field Physiology (3) Field experience on identification of fresh water algae. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A

4075 Botanical Photography (3) Photography of natural history subjects and achievement of technical and aesthetic skills and knowledge to produce illustrations for class, seminar or public lecture. Landscape, habitat, close-up, and small object photography. Prints 35 mm format. Limited shared equipment available. Students encouraged to use own equipment. Film and processing costs paid by student. Photos processed and critiqued in class. Prereq: 6 hrs of botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A

4080 Field Pteridology (3) Field experience on identification of ferns and fern allies. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs of botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A


4240 Paleobotany (4) (Same as Geology 4240.)

4310 Plant Ecology (4) Interactions between individual species, species and their environments. Circulation of energy and matter in ecosystems. Theoretical and laboratory periods and at least two weekend field trips. Prereq: 3030 or equivalent. F, Sp, A

4330 Field Measurements in Plant Ecology (3) Practice in use of hand and laboratory instruments for measurement of environmental factors, plant function, and/or community characteristics. Data collection, analysis, and interpretation of data. Visits to highly instrumented field sites. Prereq: 3030 or equivalent; 1 yr physics and chemistry recommended. F

5000 Thesis (1-15) E

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

5003-04 Non-Thesis Research (3) Library, field, or laboratory research under supervision of staff members. Not for thesis candidates.

5011 Mycology (4) Intensive survey of fungi, including members of the phyla Basidiomycetes and Ascomycetes (4) Similar to 5090, but dealing with Phycomycetes. Prereq: 5011 or consent of instructor.

5021 Bryology (4) Taxonomy, phylogeny, ecology, physiology, and developmental morphology of bryophytes with emphasis on field studies and current research. Prereq: 5010, 5011 or 4017. Recommended prereq: 5061. 1 hr and 3 labs. F, A

5023 Lichenology (4) Taxonomy, phylogeny, ecology, economics and symbiosis of lichens with emphasis on field studies and current research. Prereq: 5010, 5011 or 4017. Recommended prereq: 5061. 1 hr and 3 labs. F, A

5031 Vascular Plant Taxonomy (4) Family characteristics of vascular plants, including principles of phylogeny and classification, based primarily on plants of local flora. Prereq: 3030 or equivalent. 2 hrs and 2 labs. Sp, A

5061 Physiology (4) Intensive comparative study of major divisions of algae, both freshwater and marine. Taxonomic, ecological, morphological, developmental and phylogenetic aspects. Field and laboratory studies, identification and classification; introduction to experimental procedures. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs. Sp, A

5065 Phytoplankton Ecology (4) Interaction between environment and phytoplankton. Nutrient uptake, primary production, competition, ecological theory applied to phytoplankton communities, and physiological adaptations by populations to environment. Prereq: 3010 or consent of instructor. F

5070 Principles of Biological Illustration (3) Principles and applications in illustrating plant morphology, including photomicrography and photomacrography, drawing graphics, and other methods for recording and preparing botanical and zoological literature. Introduction to publication of data in pictorial or graphic form. 1 hr and 2 labs. W

5080 Pteridology (4) Evolutionary study of lower vascular plants: morphology, cytology, life cycles and classification. Biosystematic studies and recognition of local species. Prereq: 5020-30 or consent of instructor. 2 hrs and 2 labs or field trips. F, A

5090 Morphology and Evolution of Basidiomycetes (4) Structure and function of fungal and sexual life cycles as applied to evolution in group. Cultures and specimens in laboratory. Prereq: 3010 or equivalent. F

5120 Agrostology (4) Collection, identification, classification, and phylogeny of tribes of grasses. Prereq: 3030 or consent of instructor. 2 hrs and 2 labs. F, A

5150 Advanced Morphology of Flowering Plants (4) Vegetative and reproductive organography: regional and systemic phylogenetic, morphogenetic, embryology and deviations, seed and fruit development. Prereq: 3020-30 or 4120; 3210 or consent of instructor. 2 hrs and 2 labs. F, A

5160 Biosystematics (4) Major experimental methods used in systematics and application to specific types of systematic problems. Cytotaxonomy, numerical taxonomy and chemotaxonomy. Prereq: Consent of instructor. F, A

5210 Advanced Plant Physiology I (3) Plant cell metabolism: carbon, nitrogen and sulfur assimilation, respiration and biosynthesis of specialized plant products such as terpenoids, alkaloids and pigments. Prereq: Chemistry 3231. F

5220 Advanced Plant Physiology II (3) Physi ology, response of plants to light: photochemistry, photosynthesis, and phytochrome mediated responses. Water and solute uptake, ion and movement; translocation; and fundamentals of mineral nutrition. Prereq: 5210 or Biochemistry 4120 and a cell physiology course. Recommended prereq: 1 yr of physics. W

5235 Advanced Plant Physiology III (3) Growth and differentiation of plants at molecular, cellular and organismic levels. Hormonal regulation of development, macromolecular interpretation of differentiation, dormancy, germination, flowering; and senescence. Prereq: 5210 or Biochemistry 4120 and a plant cell physiology course. Recommended prereq: 5220. Sp

5240 Quaternary Problems (4) (Same as Geology 5290 and Zoology 5292.)

5310-20-30 Special Problems in Botany (1-5, 1-4, 1-8)

5340 Plant Geography (4) Distribution of ecosystems emphasizing embryonic and/or postembryonic naturalization, climatic and historical aspects. Prereq: 4310. 2 hrs and 2 labs. W

5350 Analysis of Plant Communities (4) Plants as ecosystems and ecosystems components considered from standpoint of their relations to each other, trophic relationships, stability, self-organization, composition and development of ecosystems. Prereq: 4310. 2 hrs and 2 periods (field trips). Sp

5350 Marine Ecology (3) Relationships of marine organisms to environment and their interactions with each other. Trophic relationships in neritic, coastal and estuarine ecosystems; succession; deep-sea ecology, stability. Prereq: One previous ecology course.

5410-20-30 Seminar in the Teaching of College Botany (1, 1, 1) Objectives in teaching of general botany. Supervised teaching in general course, seminars and techniques, testing, concepts, and materia. Required of teaching assistants. Prereq: Consent of instructor. S/NC only. F

5440 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 12 hrs. S/NC only. E


5820-21-22-23-24 Methods and Instrumentation in Laboratory Investigation (1, 1, 1, 1, 1) Laboratory course providing project experience and theoretical background in various research methods, long-term research projects, spectroscopy, electron microscopy, electron microscopy, culture methods, use and detection of radiotopes, and others. Prereq: Course in plant physiology. Prereq: 3211-21-31 or equivalent. Prereq: 5210-20-30 or equivalent. S/NC only. E


5850-51-52-53-54 Methods and Instrumentation in Field Investigations (1, 1, 1, 1, 1) Intensive field work using appropriate methods and instrumentation. Topics vary according to needs of students. May be repeated with consent of instructor. S/NC only.

5870 Experimental Plant Genetics (4) Genetics of plants with emphasis on morphological, physiological, and biochemical aspects and including mechanisms of gene action, controlling elements, transformation, cytoplasmic inheritance, and adaptation of students to Biology 3110 and Chemistry 3251. 3 hrs and 1 lab. W

5910-20 Developmental Plant Morphology (3, 1) Developmental morphology of plants from aspect of phenomena of morphogenesis-correlations, polarity, symmetry, differentiation, regeneration, tissue mixtures, abnormal growth, environmental and genetic factors. Prereq: 3010-20 or 4120, and 3210 or 5210 for 5910 or 5920. 5 hrs for 1 lab and 1 lab for 5910. Prereq: F, A, W.

6000 Doctoral Research and Dissertation (2-15) E

6010 Advanced Topics in Morphology of Vascular Plants (2-4) Needs of students determine content. Topics selected from broad categories of experimental anatomy, morphology, and morphogenesis. Prereq: 3020-30 or 4120. 5810-20 or consent of instructor. May be repeated with consent of department.

6060 Advanced Topics in Cryptogamic Botany (2-4) Advanced studies and current research in experimental physiology, mycology, bryology, plaeology, or developmental morphology of cryptogams. May be repeated with consent of department.

6210 Photobiology (3) Interaction of nonionizing radiation with living systems. Prereq: Physics 2210-20-30 or equivalent. S/NC only. E

6310 Advanced Topics in Cytology and Cell Biology (2-3) Requirements and interests of students determine topics, such as actions of chemicals on mitosis, effects of stress on cells, and the like those required by granting and contracting agencies. May be repeated with consent of department.

6920 Advanced Topics in Systematic Botany (2-4) Needs of students determine content, such as adaptations and evolution of vascular plants; biolosystematics (systematic literature and code of nomenclature), cryptogamic botany, taxonomy, and research in systematics; systems of classification; Seminars or lectures and labs depending on subject. Prereq: 5020 or 5031. May be repeated with consent of department.

Chemistry

MAJOR DEGREES

Chemistry M.S., Ph.D.

Professors: G. Mamantov (Head), Ph.D. Louisiana State; N. S. Bowman, Ph.D. Princeton; C. A. Buehler (Emeritus), Ph.D. Ohio State; W. E. Bull, Ph.D. Illinois; J. D. Chambers, Ph.D. Kansas; A. A. Dean (Emeritus), Ph.D. Michigan; J. F. Eastham Ph.D. California (Berkeley); W. H. Fletcher, Ph.D. Minnesota; C. W. Keenan, Ph.D. Texas; D. C. Keeler, Ph.D. Princeton; J. W. Larsen, Ph.D. Purdue, Ph.D. Missouri; G. D. O'Keefe, Ph.D. California (Berkeley); J. R. Peterson, Ph.D. California (Berkeley); G. K. Schenitzer, Ph.D. Illinois; D. A. Shirley (Emeritus), Ph.D. Alaska; V. A. Smith (Emeritus), Ph.D. Harvard; W. T. Smith (Emeritus), Ph.D. Ohio State; W. A. Van Hook, Ph.D. Johns Hopkins; E. L. Wehry, Ph.D. Purdue; F. T. Williams (Emeritus), Ph.D. London; T. F. Williams, Ph.D. North Carolina.

Associate Professors: J. E. Bloor, Ph.D. Manchester; F. A. Grillm, Ph.D. Cornell; G. W. Kabalka, Ph.D. Purdue, Ph.D. J. Kinzie, Ph.D. Akron; Ph.D. A. Lane, Ph.D. California (Berkeley); R. M. Magid, Ph.D. Yale; R. M. Magni, Ph.D. Wisconsin; F. M. Schell, Ph.D. Indiana.

Assistant Professors: J. L. Adcock, Ph.D. Texas; J. D. Alexander, Ph.D. California (Berkeley); J. D. Kovac, Ph.D. Yale; L. J. Magid, Ph.D. Tennessee; M. J. Sempack, Ph.D. Iowa State; C. Woods, Ph.D. North Carolina State.

Students majoring in Chemistry for the Master's or doctoral degree are required to present as a prerequisite one year each of general, analytical, organic and physical chemistry with a satisfactory record. Students lacking any of these prerequisites may be admitted with appropriate deficiencies which must be removed without graduate credit. For students majoring in Chemistry, the prerequisite two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

The department offers specialization in seven areas for the M.S. degree: analytical chemistry, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and physical chemistry. The requirements for the M.S. degree in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give 9 to 18 hours of graduate credit (5000).
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate course work in chemistry and/or related fields to give a total of 45 hours. For emphasis in environmental chemistry, these additional courses must include Chemistry 5220, 5250-60-69-79, Ecology 5310, and Environmental Engineering 4030. For emphasis in physical chemistry, these additional courses must include Chemistry 5220, 5250-60-69-79 or 5420-30 or 5710-20-30, 5810, and Mechanical Engineering 4180. All course selections must be approved by the appropriate departmental committee.

4. Participation in seminar (5911-21-31) during the entire period of graduate study. (No more than 3 credit hours of seminar may be applied to the above requirements.)
5. Final oral examination.

THE DOCTORAL PROGRAM

The department offers specialization in nine areas for the Ph.D. degree: analytical chemistry, chemical physics, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and theoretical chemistry. For the Ph.D. degree in Chemistry with specialization in analytical, inorganic, organic, physical, or theoretical chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate course work in chemistry and/or related field to make an overall total of 45 hours.
4. Participation in seminar (5911-21-31) during the entire period of graduate study.
5. Thirty-nine hours of additional graduate course work including at least 6 hours at the 6000 level and one of the following groups: (a) for analytical 5250-59-60-69-70-79, 5340-50, 5410-20-30, 5710-20-30; (b) for inorganic, 5420, 5710-20-30; (c) for organic, 5110-20-29-30-35 and at least 9 hours from...
the following courses: 5250-60-70, 5340-50, 5410-20-30-50, 5710-20-30 (d) for physical, 5340-50, 5410-20-30-50; (e) for theoretical, 5340-50, 5410-20-30-50, Physics 5210. Graduate course work in related fields may be used for undesignated course work in this requirement upon approval of the student's faculty committee.

5. A comprehensive advanced examination in the field of specialization.

6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

7. A final oral examination.

The requirements for the Ph. D. degree in Chemistry with specialization in environmental science include the satisfactory completion of:

1. Research and a dissertation on an energy or environment-related problem to give at least 36 hours of graduate credit.

2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.

3. Participation in seminar (5911-21-31) during the entire period of graduate study and a six-month internship in a governmental or industrial laboratory.

4. Thirty-nine hours of additional graduate course work including 6 hours at the 6000 level. For emphasis in energy, these additional courses must include Chemistry 5220, 5250-59-60-69-70-79, Ecology 5310, Environmental Engineering 4030, plus selected courses from other areas of chemistry, environmental engineering, microbiology, health physics, ecology, computer science, statistics, and industrial health. For emphasis in energy, these additional courses must include Chemistry 5410, 5610-20-30, a chemistry sequence (Chemistry 5110-20-30-35 or 5260-60-70 or 5420-30 or 5710-20-30, 5810), Mechanical Engineering 4180, plus other course selections from areas such as catalysis, heterogeneous equilibria, kinetics, thermostability, corrosion, furan and propylene engines, resource economics, nuclear engineering, and electrical engineering. All course selections must be approved by the appropriate departmental committee.

8. A comprehensive advanced examination.

9. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

10. A final oral examination.

For the Ph. D. degree in Chemistry with specialization in polymer science, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).

2. Chemistry 4160-70, 5511, 5410-50, 5160 or 5170, Polymer Engineering 4910.

3. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.

4. Thirty hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.

5. A comprehensive advanced examination in polymer science.

6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

7. A final oral examination.

*3219-21-31 Organic Chemistry (3, 3, 3) Compounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Must be taken. Prereq: 4110-20-30-50. Corresponding laboratory (3219-29-39) is a coreq for students not having credit for the lecture.

*3219-29-39 Organic Chemistry Laboratory (1, 1) Experiments on topics discussed in 3219-31. Corresponding lecture (3219-21-31) is a coreq for students not having credit for the lecture.


*3511-21-31 Principles of Organic Chemistry (3, 3, 3) Structure and stereochemistry. An introduction to the structural problems emphasized involving synthetic utility. Use of spectroscopic and physical techniques to elucidate structure. Recommended: for chemistry majors and students planning careers in physical or biological sciences. Must be taken in sequence. Prereq: 1110-20-30. Corresponding laboratory: 3219-29-30 or 3219, 3529-39 as a coreq; latter is recommended.

*3529-39 Organic Chemistry Laboratory (1, 1) Experiments on topics discussed in 3221-31. Similar to 3229-39 except designed for students who have need for operating knowledge of various spectroscopic and chromatographic techniques. Corresponding lecture (3529 or 3221-31) is a coreq for students not having credit for the lecture.

*3810 Radioactivity and Its Application (3) Radioactive materials in tracer and therapeutic applications. Radioactive decay, detection apparatus and techniques, tracer procedures and safety precautions in agriculture, biology, medicine, nutrition. Not for credit by chemistry or physics majors or minors. Prereq: 1 yr of general mathematics or equivalent, 1 yr of general chemistry, 2 hrs and 1 lab. F, W, Sp.

10. A comprehensive final examination.

11. A final oral examination.

12. A final oral examination.

13. A final oral examination.


15. A final oral examination.

16. A final oral examination.

17. A final oral examination.

18. A final oral examination.

19. A final oral examination.

20. A final oral examination.

21. A final oral examination.

22. A final oral examination.

23. A final oral examination.


25. A final oral examination.

26. A final oral examination.

27. A final oral examination.

28. A final oral examination.

29. A final oral examination.

30. A final oral examination.

31. A final oral examination.

32. A final oral examination.

33. A final oral examination.

34. A final oral examination.

35. A final oral examination.

36. A final oral examination.

37. A final oral examination.

38. A final oral examination.

39. A final oral examination.

40. A final oral examination.

41. A final oral examination.
nance, infrared, and mass spectrometry. Prereq: 3211-19-21-29-31 or equivalent.

5140 Introductory Polymer Chemistry (3) Fundamental principles, role of chemistry in interdisciplinary field of polymer science; reliance of molecular structure to bulk properties of polymers. Prereq: 1 yr each undergraduate organic and physical chemistry, Sp.

5150 Kinetics of Polymerization (3) Kinetics of formation and molecular weight distributions of polymers, homogeneous and heterogeneous step growth polymerizations. Prereq: 5140 and 4160-70 or equivalent.

5160 Organic Chemistry of Polymers (3) Synthesis of monomers; mechanism, stereochemistry, and sequence distribution of polymerizations. Formation of block, graft, and network polymers. Reactions on polymers, including degradation. Prereq: 5140 and 5531. A

5170 Physical Chemistry of Polymers (3) Rubber elasticity, solution properties of macromolecules; structural, configurational, and conformational statistics of polymers. Prereq: 5150. A

5220 Analytical Chemistry of Environmental Pollutants; application of modern analytical chemistry to problems in aquatic and atmospheric pollution. Prereq: 5250-60-70 or consent of instructor. Sp

5240 Chemical Instrumentation (4) Principles of chemical instrumentation. Practice in design and construction of chemical instruments; special project. Prereq: Consent of instructor.

5250-60-70 Advanced Analytical Chemistry (3, 3, 3) 5250—Absorption and emission spectroscopy, structure elucidation by IR, NMR, UV, and mass spectra; 5260—Chemical separation methods: solvent extraction, chromatography, electrolysis, and electromigration methods; fluorescence and x-ray methods; 5270—Electroanalytical, magnetic and thermal analytical methods; and stream and automatic analysis. Prereq: 1 yr of physical chemistry. F, W, Sp

5259-69-79 Advanced Analytical Chemistry Laboratory (1, 1, 1) Experiments in use of chemical separation methods and instrumental methods covered in concurrent lecture course. Prereq: 1 yr of physical chemistry. Prereq or coreq: 5250 for 5259; 5260 for 5269; 5270 for 5279. F, W, Sp

5340 Quantum Chemistry (3) Postulate approach to fundamental principles of quantum mechanics. Accurate solutions to Schrödinger equation; approximate (ab initio and semiempirical) molecular orbital methods; calculation of molecular properties. F

5350 Quantum Chemistry (3) Electronic excitations of small molecules; vibrational theory; perturbation theory; reactivity of organic molecules. Prereq: 5340. W

5410-20-30 Advanced Physical Chemistry (3, 3, 3) 5410—Classical thermodynamics. 5420—Molecular spectroscopy and structure. 5430—Chemical kinetics. Prereq: 4110 or 4160-70. F, W, Sp


5511 Survey of Inorganic Chemistry (3) Atomic structure, wave mechanical atoms, ionic and covalent bonding, periodic relationships of elements, inorganic stereochemistry, coordination chemistry, and descriptive chemistry of the elements. F

5521 Survey of Analytical Chemistry (3) Volumetric and gravimetric analysis; acid-base, oxidation-reduction, precipitation and titration equilibria; spectrophotometry, electroanalytical, and separation methods. F

5531 Survey of Organic Chemistry (3) Bonding in organic molecules, chemistry of hydrocarbons, alcohols, carboxylic acids, esters, aldehydes, ketones, aromatics, steroids, carboxylic acids, esters, aldehydes, ketones, aromatics, steroids, amines, and nitriles. A

5550 Industrial Chemical Research (3) Practice of modern industrial research taught by case studies and visiting lecturers from industry. Course content varies, selected to illustrate good past and current industrial research practices. Prereq: Completion of a 5000 chemical research course. Prereq: 5140-20-30-35.

5610-20-30 Chemical Basis of Energy Conversion (1, 1, 1) Chemistry of various energy and fuel interconversion systems. Introduction to homogeneous and heterogeneous catalysis, thermodynamics of energy conversion systems, fossil fuels chemistry, and electrochemical and photochemical systems. Prereq: 5410 and one 5000 sequence. F, W, Sp

5710-20-30 Theoretical Inorganic Chemistry (3, 3, 3) 5710—Nature of chemical bonding; ionic, covalent, metallic, molecular. 5720—Coordination compounds. 5730—Investigational methods of structural inorganic chemistry. Prereq: 1 yr of physical chemistry. F, W, Sp

5810 Nuclear Chemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, data collection and radiation detection. Prereq: 1 yr of physical chemistry. A

5911-21-31 Chemistry Seminar (1, 1, 1) Departmental research topics, selected to illustrate good past and current research practices. May be repeated. Registration required each quarter except summer for resident graduate students. S/NC only. F, W, Sp

6000 Doctoral Research and Dissertation (3-15) E

6111 Selected Topics in Organic Chemistry (3) Subject matter varies among important topics of current significance. Prereq. Consent of Instructor. May be repeated. Maximum 9 hrs. A

6130 Natural Product Chemistry (3) Structure, chemistry, systems, synthesis of naturally occurring substances of biological or environmental significance. Course content may vary with each offering to reflect areas of current chemical interest. Prereq. Two of 5110-20-30-35.


6165 Orbital Symmetry Control (3) Application of Woodward-Hoffmann rules and other theories to mechanism and stereochemistry of concerted organic reactions. Prereq: Two of 5110-20-30-35.

6175 Organic Photochemistry (3) Physical and chemical effects of electron excitation of organic molecules. Experimental and theoretical techniques of photochemical importance. Inter- and intra molecular reactions of alkynes, ketones, dienes, dienes, aromatic compounds, and other photocative species. Prereq: Two of 5110-20-30-35.

6190 Organometallic Chemistry (3) Structure, bonding and synthesis of organometallic reagents. Application to current problems in organic synthesis. Prereq: Two of 5110-20-30-35.

6210 Advanced Analytical Spectroscopy (3) Newer methods of analysis for inorganic and organic samples, including transform methods, lasers in spectroscopy, fiber optic, introductory nonlinear optics, and spectroscopic techniques for remote sensing. Prereq: 5505.

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5140-20-30-70 or consent of instructor. May be repeated.

6220 Natural Polymers (3) Structure, modification, and nonbiochemical utilization of natural polymers and synthetic polymers prepared industrially. Prereq: 5140 or two of 5110-20-30-35.

6221 Nuclear Magnetic Resonance (3) Theory of nuclear magnetic resonance. Spectroscopy with emphasis on high-resolution methods. Applications to problems in molecular structure and behavior. Prereq: Two of 5110-20-30-35.

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes pursuant to excitation of molecules by photons and electrons, multiphoton processes and uses of laser sources; fluorescence and phosphorescence; radiationless transitions as studied by opotscopic spectroscopy; chemical reactivity of excited states; ion-molecule and free radical reactions; electron capture and electron-transfer processes. Prereq: 5450.

6450 Electrochemistry (3) Electrical double layer; electrode kinetics; transport properties of electrolytes; electroanalytical methods. Prereq: 5430 or 5270.

6475 Electronic Structure of Radicals (3) Application of electronic spectroscopy to study of molecular structure, and bonding in organic and inorganic radicals; comparison of experimental results with theoretical predictions based on valence rules and on INDO molecular orbital calculations. Prereq: 5430-50 and 6820.

6480 Statistical Thermodynamics (3) Application of statistical mechanics to systems of chemical interest such as isotope effects on equilibrium and rate processes, phase equilibria, condensation phenomena. Prereq: 5410, 5430.

6495 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at molecular level including topics such as dynamics of molecular collision, potential-energy surfaces, reaction cross-sections, direct vs complex modes of reaction, photofragmentation, energy partitioning and transfer, chemiluminescence, and chemical lasers. Prereq: 5430.

6510 Thermodynamics of Solutions (3) Theory of regular solutions and of electrolyte solutions; measurement of activity coefficients and other solution properties; selected topics from literature. Prereq: 5410.

6520 Magnetic Resonance (3) Principles of magnetic resonance spectroscopy underlying nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq: 5340.

6711 Selected Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance: photoelectron spectroscopy, transition metal chemistry, organometallic compounds, inorganic solution kinetics and mechanisms, crystal chemistry, nonbiochemical utilization of halogens and compounds. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6730 Topics in Quantum Chemistry (3) Application of newer methods to complex systems including metal complexes, polymers, and molecules of biological significance. Time dependent phenomena, (effect of external fields and time dependency) and current theories of chemical reactivity. Prereq: 5430-50.

6750 Molten Salt Chemistry (3) Structure, spectroscopic properties, solution thermodynamics, electroanalytical and phase equilibria of molten metals and solutions. Prereq: 5410 and 5430 or equivalent.

6810 Vibrational Problems in Molecular Spectra (3) (Same as Physics 6810.)
3210 Plato (3) A
3220 Herodotus (3) A
3230 Euripides (2) A
4020 Aeschylus, Sophocles (3) A
4030 Lysias (3) A
4040 Aristophanes (3) A
4050-60-70 Directed Readings in Greek (3, 3, 3) F, W, Sp

Latin
3440 Livy (3) A
3450 Pliny and Martial (3) A
3460 Elegiac Poets (3) A
4120 Horace, Satires and Epistles (3) A
4310 Selected Readings from Latin Literature (3) A
4320-30 Selected Readings from Latin Literature (3, 3) May be repeated: A; A
4340 Horace, Odes (3) A
4350 Tacitus (3) A
4360 Lucretius (3) A
4370 Readings In Medieval Latin (3) A
5410-20-30 The Latin Epic: Lucretius, Vergil, Lucan (3, 3, 3) A; A; A
5510-20-30 Roman Comedy; Plautus, Terence (3, 3, 3) A; A; A

GENERAL COURSES
3210 Early Greek Mythology (3) Comprehensive study of Greek myths through readings, lectures, and discussion with emphasis on significance for Greek thought and religion. Slides and tapes illustrate influence of Greek myths on art, music, and literature of ancient Greece and later cultures. (Same as Religious Studies 3210) F
3220 Greek Mythology in the Classical Period (3) A study of use of myth in literature, history, religion, philosophy, and art of Classical Age of Greece, and change (3) of attitude toward myth from earlier periods. Familiarity with basic Greek myths is assumed. Readings, lectures, slides, and discussion. (Same as Religious Studies 3220) W

3230 Roman Mythology (3) Study of myths created by Romans, as well as those the Romans borrowed from the Greeks, with reference to Roman attitude toward history, religion, and society. Readings, lectures, slides, and discussion. (Same as Religious Studies 3230) Sp
3310 Art and Archaeology of the Aegean Bronze Age and Early Greece (3) Troy, the Cyclades Islands, Greek mainland, and Crete. Emphasis on palaces of Crete and Mycena, Tiryns, Pylos, their fall, the following Dark Age, and rebirth of Greek civilization. Illustrated lectures. F
3320 Art and Archaeology of Archaic and Classical Greece (3) Survey of development of Greek architecture, sculpture, and painting from 800 B.C. to death of Alexander. Illustrated lectures. W
3330 Art and Archaeology of Hellenistic Greece and Rome (3) Hellenistic Greek, Etruscan, and Roman sculpture, painting, and architecture with attention to city planning. Illustrated lectures. Sp
3340 Cities of the Greek and Roman World (3) Archaeological survey of Greek and Roman cities from 3000 B.C. to 500 A.D. with emphasis on development of city planning and quality of life. Such cities as Mycenae, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied. F
3350 Shrines and Sanctuaries of the Greek and Roman World (3) Survey of major shrines and sanctuaries of Greek and Roman world with emphasis on archaeological remains. Such sites as Olympia, Epidauros, Paestum, Cuma, Praeneste, and Baalbek will be considered. Readings in selected classical authors will add to understanding of place of great shrines and sanctuaries in Greek and Roman life. Sp
4010 Greek Drama in English Translation (3) Survey of dramatic masterpieces of Greek literature. A
4210 Teaching of Latin (3) Carries no language credit. Purposes, techniques, materials, and evaluation; directed observation in public schools; preparation of teaching plans and materials. A
4220 Seminar in Classical Studies (3) Special problems in literatures and other arts of Greece and Rome. May be repeated with consent of department. W
4230 Classical Mythology and its Uses (3) Intensive review and survey of Greek and Roman mythology. Emphasis on uses of classical mythology in literature, music, and plastic arts, especially of modem times. A
4510 Selected Readings in Latin Literature in Translation (3) Content varies; may be repeated with consent of department. A
4610 Studies in Classical Archaeology (3) Variable content course offering subject matter not taught in existing course, or concentrating on one aspect of existing survey. Prerequisite: According to topic. May be repeated. Maximum 9 hrs.

5520 Problems in Old World Archaeology (3) (Same as Anthropology 5620) A

Computer Science

Major

DEGREE

Computer Science M.S.

Professors:

R. M. Aiken, Ph.D. (Texas); R. C. Gonzalez, Ph.D. (Florida; Electrical Engineering); T. Gregory, Ph.D. (Florida; Electrical Engineering); K. C. O'Kane, Ph.D. (Florida; Electrical Engineering);

Associate Professors:

R. M. Aiken, Ph.D. (Texas); R. C. Gonzalez, Ph.D. (Florida; Electrical Engineering); K. C. O'Kane, Ph.D. (Florida; Electrical Engineering); M. A. Thomsen, Ph.D. (Seattle)

Assistant Professors:

R. W. Heller, Ph.D. (Southern Methodist); D. L. Matuszak, Ph.D. (Texas); M. R. O'Kennon, Ph.D. (Clarkson); H. S. Rady, Ph.D. (Notre Dame); D. M. Wright, Ph.D. (Virginia)

Entrance Requirements

To M.S. Program

Upon admission to the Graduate School, students who wish to enter the Master's degree program in Computer Science should have the following background:

1. Mathematical maturity at least equivalent to that of a student who has completed the calculus sequence through one year of multivariable calculus and matrix algebra.
2. Computer Science 3151 or an equivalent introductory course in computer programming.
3. An introduction to probability and statistics at least at the level of Statistics 3450.
4. Computer Science 3175 or an equivalent introductory course in discrete structures and logical foundations of computer science.
5. Computer Science 2610, 2710, or 3520 or equivalent courses in advanced FORTRAN programming, program organization and assembler language programming.

The Master's Program

All students must receive departmental credit for or exhibit proficiency in the following courses:

1. Computer Science 4550, 4510, 5100 and 5109.
2. Electrical Engineering/Computer Science 5175 and 5940.
3. One of the three courses Computer Science 4710, 4730, or 4225. The student may then select either Plan A or Plan B.

Plan A: Thesis Option

1. Complete 36 hours of courses at the 4000 level or above. These must include at least 18 hours at the 5000 level in addition to the 5000 level courses explicitly required for the degree.
2. Complete at least 9 additional hours of thesis credit. Computer Science 5000.
3. Pass an oral examination by a committee of at least three faculty members.

Plan B: Non-Thesis Option

1. Complete 45 hours of courses at the 4000 level or above. These must include at least 27 hours at the 5000 level in addition to the 5000-level courses explicitly required for the degree.
2. Pass written and oral comprehensive examinations.

Under either plan, a student wishing to count a course from another department towards the graduate degree must have prior written approval from the computer science graduate committee.

3150 Introduction to Numerical Algorithms and Programming (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. Introduction to programming in FORTRAN. 3150 and 3155 may both be taken for credit. Students with a knowledge of FORTRAN should take 3155. Prerequisite: Mathematics 2960. (Same as Mathematics 3150) E

3155 Introduction to Numerical Algorithms (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. 3155 and 3156 may not both be taken for credit. Students with a knowledge of FORTRAN should take 3155. Prerequisite: 1510 or 1610 or consent of instructor. Prerequisite: Mathematics 2960. (Same as Mathematics 3155) E

3715 Discrete Structures (3) Introduction to discrete mathematics used in computer science and mathematics. Sets, set logic, Relations, functions. Proof techniques, induction, logic. Graphical representations and algorithms. Graphs, trees, DFST, 5150 or equivalents. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3715). F, Sp

3725 Advanced Discrete Structures (3) Advanced topics in discrete structures useful in computer science and mathematics. Graphs and algorithms for manipulating data, algebraic structures, Boolean algebra, lattices, groups, rings, modes. Prereq: 3715 or equivalent. (Same as Mathematics 3725). W

4050 Number Systems for Digital Computers (3) Floating-point number representation, mixed-radix number representation, multiple-modulus residue number representation, finite-segment p-adic number representation, errors in floating-point computation, finite fields and exact computation using digital computers. Prereq: 3155. A


4225 Numerical Solutions to Equations and Numerical Approximations (3) (Same as Mathematics 4225). F, W

4245 Numerical Linear Algebra (3) (Same as Mathematics 4245). F

4310 Statistical Data Processing (3) FORTRAN programs for organizing and analyzing large data. SPSS and SAS programs for standard statistical analyses; frequency distributions, percentiles, data reduction correlation and regression, analysis of variance. Not for credit for computer science majors. Prereq: Statistics 2100 or equivalent. F, Sp

4330 Independent Study in Computer Science (1-3) Special project in area of student’s primary interest. To be directed by Computer Science faculty, perhaps jointly with student’s faculty advisor. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

4340 Interactive Statistical Data Processing (3) Statistical data processing using interactive computer system. Time-sharing utility and statistics programs using interactive FORTRAN. Not for credit for computer science majors. Prereq: Statistics 2100 or equivalent and 4310 or knowledge of a procedure-oriented language such as FORTRAN. W

4470 Programming Languages (4) Comparison and analysis of programming languages, design, features and implementation. Processors, operations, sequence control, data control, and storage management. Detailed discussion and programming experience in LISP and either SNOBOL, APL, or SIMULA. Prereq: 4510.

4510 Data Structures and Non-numeric Program- ming (3) Use of data structures and algorithms for their manipulation. Arrays and orthogonal lists, stacks, queues, rings, doubly-linked lists, trees, dynamic storage allocation; organization of files, program- ming languages for information structures. Prereq: 2710 and 2160 or 2610.

4550 Systems Programming (3) Computer organization, operating systems, debugging, machine lan- guage and design of computers, representation of information, microprogramming, software systems, interrupt handling, multiprogramming, microprocessors, massassem- blers. Prereq: 3520 or equivalent. E

4570 Introduction to Data Base Management Systems (3) Hierarchical, network and relational models; logical and physical views of data. Data definition and data manipulation languages. Data inde- pendence, implementation and operational considerations. Enforces integrity, security, and recovery. Prereq: 4510 and 4550 or equivalent. Students may not receive credit for both 4570 and 5570. W

4610 Operating Systems—Concepts and Facili- ties (3) Detailed examination of major operating sys- tems. Memory, processor, device and data manage- ment, interprocess communication, output, leaders and relocation, device characteristics, data set organiza- tions, SPOOLing. Prereq: 4510 and 4550. Students may not receive credit for both 4610 and 5670. F

4620 Operating Systems—Case Studies (3) Alternatives in operating system design, dynamic re- location, paging, segmentation, time sharing, time slicing, protection, concurrency, real time systems. Examples from different operating systems analyzed as appropriate. Prereq: 4610 or equivalent or con- sent of instructor. W

4660 Compiler Construction (3) Practical experi- ence with design of compilers. Scanning, parsing, semantic processing, code generation and optimiza- tion, error detection and correction. Term project in- cludes a complete compiler for a small block-structured language. Prereq: 4510. W


4750 Interactive Computer Graphics (3) Point plot- ting vector generation, interactive graphical techni- ques, two- and three-dimensional transformation, perspective depth, hidden line elimination, shading, software and hardware system design. Discussion of use of these techniques in design, problem solving, mapping, architecture, and many other areas. Prereq: Senior standing in Computer Science, Electrical Engineering or Geography and a knowledge of com- puter programming, or consent of instructor. (Same as Geography 4750).

4820 Introduction to Pattern Recognition (3) (Same as Electrical Engineering 4820) W

4830 Digital Image Processing (3) (Same as Elec- trical Engineering 4830) Sp

4850 Small Computer Systems (3) (Same as Elec- trical Engineering 4850) E

4910 Analysis and Management of Computer In- stallations (3) Analysis of hardware and software com- ponents of computer systems; implementation, justification, personnel in systems, perspective on systems. Prereq: 3520 or equivalent or consent of instructor. W

4980-90 Special Topics in Computer Science (1- 4, 1-4) Credit determined at registration. Prereq: Re- commendation of Computer Science staff. May be repeated with consent of department. Maximum 9 hrs.

5000 Thesis (1-15) E

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

5010 Computer-assisted Instruction (3) History and development of CAI systems. Emphasis on studying success and failure of major projects, future role of CAI in education. Use of a CAI programming language to implement a CAI course. Prereq: Course- work experience or consent of instructor.

5050 Computer Modelling and Simulation of Physical Systems (3) Techniques for computer modeling and simulation, inputs, driving functions, errors, outputs, interactive simulations as applied to various physical systems. Models to represent spatial diffusion processes: 3510 or 3165, and 3520 and Statistics 3450. A

5100 Immigation to Computer Science (5) De- signed for graduate students with limited computer science background. Study of hardware, software, and com- puter science major or minor program. Advanced programming techniques in FORTRAN; control of input- output, device drivers, and graphical user interface languages programming; introduction to data structu- res and algorithm analysis. Prereq: 1510 or 1610 or 3010 or consent of instructor.

5109 Immigration to Computer Science Practi- cum (2) Design and implementation of medium to large-scale computer programs. Coreq: 5100.

5175 Introduction to Logic Design (3) (Same as Electrical Engineering 5175).

5210 Artificial Intelligence (3) Simulation of intelli- gent processes by computer. Techniques of repre- sentation, search, and manipulation for various areas; problem solving, game playing, pattern perception, theorem proving, semantic information processing. Computer simulation of AI problems. Prereq: 4510 or consent of instructor. (Same as Electrical Engineering 5560.) W

5250 Medical Computing (3) Achievements and problems associated with application of computer technology to field of health care. Various areas of medical computing; laboratory data systems, patient monitoring systems, data bases, emergency department records, automatic history taking, and hospital admin- istration systems. Prereq: 4510. Sp

5430 Advanced Compiler Design (3) Design and implementation of compilers, syntax structures, two-level grammars, compiler-compilers, incremental com- putation, run-time organization, data flow analysis, optimization, and error recovery. Prereq: 4660 and 4710. A

5455 Finite Difference Methods for Partial Diff- erential Equations (3) (Same as Mathematics 5455). F

5465 Finite Element Methods (3) (Same as Mathematics 5465). W

5475 Advanced Topics in Numerical Partial Diff- erential Equations (3) (Same as Mathematics 5475). Sp

5570 Database Management Systems (3) Data model theory, comparison of several existing data base systems, implementation technology, selection and evaluation techniques, integrity, security, au- thorization and protection, hardware architectures, and future trends in database technology. Prereq 4510 and 4550 or consent of instructor. W

5565-65-75 Numerical Mathematics (3, 3, 3) (Same as Mathematics 5565-65-75). W, F, Sp

5670-80 Advanced Operating Systems (3, 3) Theory and analysis of operating systems. Synchro- nization and deadlocks. Analysis of operating sys- tems using mathematical models, simulation, and hardware and software monitors. Comparison of good hard heuristic scheduling algorithms with best possible schedules; scheduling anomalies. Case studies of virtual memory systems. Analysis of page swapping and placement strategies. Prereq: 4610 or equivalent or consent of instructor. Sp, A


5730 Computability and Computational Complex- ity (3) Computability and decidability; Turing machines and halting problem. Register machines; Recursive and recursively enumerable sets; partial and total recursive functions. Time and space bounded computations, the P vs NP problems. Prereq: 4710. Sp, A

5750 Theory of Formal Languages (3) Phrase- structure languages, their generators and processes. Words: 0, 1, 2, and regular expressions on languages and grammars; deterministic context-free languages. Theory of translation. Prereq: 4710. W
5775 Combinatorial Algorithms (3) Algorithms for solving optimization problems in graphs, networks and databases. Precise notions of time and space complexity. Prereq: 4730. (Same as Mathematics 5775) A

5810 Information Organization and Retrieval (3) Organization, storage, searching and retrieval of information, with a study of methods of IR systems from off-line to modern on-line operations. Information analysis and dictionary construction and operations. Search and indexing procedures, retrieval process. Information dissemination systems. Data base retrieval systems. Prereq: 4510 or 4560. F


5880 Data Security (3) Need for security and methods for achieving it; encryption, machine architecture, hardware and software implementation of security mechanisms. Computer crime and misuse. Prereq: 3520 or consent of instructor.

5910-20-30 Special Topics in Computer Science (1-5, 1-6, 1-6) May be repeated. Maximum 9 hrs.

5940-50 Advanced Small Computer Systems (3, 3) (Same as Electrical Engineering 5940-50.)

5870 Independent Study in Computer Science (1-3) Special project under faculty guidance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Cultural Studies

Asian Studies

3870 Islamic Literature in English Translation (4) Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian and Turkish. Readings include The Arabian Knights, The Rubaiyat of Omar Khayyam and Gibran's The Prophet.

4010-20-30 Readings in Asian Literature (4, 4, 4) Prerequisite: Mastery of intermediate level of Japanese, Chinese, Sanskrit, or Arabic and consent of instructor.

4012 Selected Topics in Asian Literature (4) Content varies. May be repeated. Maximum 12 hrs.

4531-32-33-34 Advanced Chinese (4, 4, 4, 4) Taped language program. Prereq: 3531-32 or equivalent or consent of instructor. Must be taken in sequence.

4831-32-33 Advanced Japanese (4, 4, 4) Reading in graded primer with attention paid to finer points of grammar. Conversation, drill and composition practice with native speaker. Must be taken in sequence. Prereq: 3831-32-33.

Black Studies

3140-50-60 Directed Readings in Black Studies (1, 1, 1) Designed for students who are interested in doing intensive reading in some area of Black Studies which is defined by the student and the instructor. Prereq: 2010 or 2020 and consent of instructor.

4200 Senior Seminar on Pan-Africanism (4) Explores concepts and philosophers of Pan-Africanism and the relevance of this ideology for various societal institutions.

4300 Resource Materials in Black Studies (4) Introduction to basic references such as bibliographies, indices, and listings of audiovisuals in Afro-American history, African history, and children's literature. Prereq: 2010 or 2020 or consent of instructor.

4310 Research in Black Studies (4) Deals with Black experience and research process.*

4500 Current Issues and Topics in Black Studies (3) Problems and issues in area of Black Studies. Content and credit determined by instructor. May be repeated. Maximum 12 hrs.


4880 Afro-American Psychology (4) (Same as Psychology 4880) Comparative Literature

4012-22-32 Special Topics in Comparative Literature (3, 3, 3) Content varies; may be repeated. F, W, Sp

4050-60-70 Dante and Medieval Culture (3, 3, 3) (Same as Italian 4050-60-70). A, A

5012 Comparative Theories of Literature (3) (Same as French 5012-22-32 Special Topics in Comparative Literature (3, 3) Independent research problems. Prereq: 5012 and 5022. Sp

5022 Approaches in Comparative Literature (3) French and American schools; "comparative literature" vs. "general literature"; Van Tiegham, Carre, Baudenspencer, Wellkie. Prereq: 5012; completion of three literature courses in foreign languages above 3000, or equivalent F

5032 Studies in Comparative Literature (3) Independent research problems. Prereq: 5012 and 5022. Sp

Cultural Studies

5101 Foreign Study (1-12) See page 97.

5102 Off-campus Study (1-12) See page 97.

5103 Independent Study (1-12) See page 97.

Linguistics

4090 Topics in Linguistics (3) Content varies. May be repeated. Maximum 9 hrs.

4020-30 Historical Linguistics, Neogrammarian School, and Growth of Structuralism (3, 3) 4020—Traces development of scientific approach to linguistics from Bopp through nineteenth century. 4030—Traces change in linguistic interest brought about by Saussure's Cours and growing impact of anthropology and behaviorism on linguistic studies.

4250 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Spanish 4250.)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, Spanish 4260.)

4270 Introduction to Romance Linguistics (3) (Same as French, Spanish 4270.)

4271 Introduction to Slavic Linguistics (3) (Same as Russian 4271.)

4460 Sociolinguistics (3) (Same as English 4440.)

4450 Dialectology (3) (Same as English 4450.)

4460 Special Topics in English Linguistics (3) (Same as English 4460.)

4471-81 English as a Second or Foreign Language (3, 3) (Same as English 4471-81.)

Economics

See College of Business Administration.
subjects other than English. Normally a student with the M.A. from another university may transfer at least 36 quarter hours.

After all, or most, of the course work has been taken and after the two language requirements have been satisfied, the student will take four comprehensive examinations from several areas divided as the department directs. Successful completion of these examinations will be followed by the writing of the dissertation and by an oral examination in the field of the dissertation.

Any course in the 5000 or 6000 series may be repeated for credit with the permission of the department.

'121 Written and Oral English for Foreign Students (8) Rapid review of English grammar structures and pronunciation with intensive drill and written drill. Required during the first quarter of residence of all foreign students (graduates, undergraduates, and transfer students) who are not excused from it on the basis of the English Proficiency Examination required of every new foreign student. A, B, C, I, F, W grading. Students registered for this course are permitted to register for only 2 other courses.

'121 Written and Oral English for Foreign Students (8) Rapid review of English grammar structures and pronunciation with intensive drill and written drill. Required during the first quarter of residence of all foreign students who on the English Proficiency Examination demonstrate the need for work in English structure, but not at the intensive level of English 1211. Required of all foreign students who complete 1211. A, B, C, I, F, W grading. Students registered for this course are permitted to register for only 2 other courses.

3070 Modern British Poetry (3) From Housman to Thomas and more recent poets.

3080 Modern American Poetry (3) From Robinson to Stevens and more recent poets.


3135 Tennyson and His Successors (3) Includes such poetry as that by the Pre-Raphaelites, humorists, and Decadents.

3136 Browning, Arnold, and Hopkins (3)

3150 Melville (3)

3210-20 English Literature and Culture of the Nineteenth Century (3, 3) Survey of literature dealing with leading movements in politics, science, religion, and the arts. 3210—1800 to 1835. 3220—1835 to 1870.

3411-12-20 Modern Drama (3, 3, 3, 3) 3411—Contemporary since 1930. 3420—British. 3430—American.

3510 Sixteenth-century Prose and Poetry (3) More and Wyatt to Spenser.

3520 Elizabethan Drama (3) Marlowe, Jonson, and others.

3530 Jacobean Drama (3) Beaumont and Fletcher to Massinger and Shirley.

3810 Restoration and Eighteenth-century Poetry (3) Jesuits, cavaliers, Restoration and Caroline poets.

3820 Restoration and Eighteenth-century Drama (3) Dryden through Sheridan.

3830 Restoration and Eighteenth-century Prose (3) Defoe, Addison, Steele, Swift, and others.

3850 The Age of Johnson (3)

3710 Literature of the English Bible (3) Types of Old Testament literature, excluding Wisdom literature.


3721 Introduction to Folklore (3) Essential terms and concepts in modern folklore—folk life studies. Emphasis on American materials; folklore, folk song, myth, legend, proverb, riddles, superstitions, dance, games, and architecture.

3910-20-30 Comparative Literature (3, 3, 3) 3910—Ancient. 3920—Medieval and Renaissance. 3930—Modern. A

3940 The Novel of the Contemporary Western World (3) Proust, Joyce, Mann, and others.

4010-20 Shakespeare (3, 3) 4010—Early plays, c. 1590-1601, including Henry IV, Twelfth Night, and Hamlet. 4020—Later plays, 1601-1613, with emphasis upon tragedies and drama, laic romances. E

4042-43 Topics in Mode and Genre (3, 3) Content varies. Special topics in principal forms and modes of British and American literature, e.g., comedy, tragedy, epic, lyric, satire, etc. May be repeated with consent of department. Maximum 6 hrs each.

4045-46 Topics in Literary Theory and Criticism (3, 3) Content varies. Special topics in theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 6 hrs each.

4050-60-70 American Novel (3, 3, 3) 4050—From earliest sentimental novels through Brown, Cooper, Washington Irving, Cooper, and James Fenimore Cook, 1820; 4060—Henry James and Mark Twain through early works of Faulkner and Hemingway. 4070—Early thirties to 1945. E

4090 Topics in Film Study (3) Content varies. In-depth study of particular directors, film genres, national cinema movements, or other topics. May be repeated with consent of department. Maximum 6 hrs. A

4140-50 Technical Writing (3, 3) 4140—For students planning careers in the physical, life and health sciences, engineering, architecture, and for those preparing laboratory reports and research papers. 4150—Writing of scientific feature articles in which data are marshaled and analyzed for human interest. F, W, Sp.

4250 Advanced Fiction-Writing (3) Further development of skills acquired in basic Writing Fiction course. Prerequisite: 3450 or consent of instructor.

4254 Writing the Detective and Mystery Story (3) Instruction and writing cover entire crime field—suspense, mystery, procedural, private eye, spy, adventure fiction. Recommended prerequisite: 3450-70-80 or consent of instructor.

4256 Writing Science Fiction and Fantasy (3) Survey of general development and basic texts of Science Fiction, Speculative Fiction and Fantasy. Exercises in writing in genres, in accordance with technical questions learned in basic Writing Fiction course.

4270 Advanced Poetry Writing (3) Further development of skills acquired in basic Writing Poetry course. Prerequisites: 3450 or consent of instructor.


4400 Sociolinguistics (3) Exploration of language patterns in terms of correlations between them and their social context. Examination of effects of language upon culture, and vice versa. Prerequisite: 3450 or consent of instructor. (Same as Linguistics 4440.)

4450 Dialectology (3) Theories and methodologies of dialect research, fieldwork, and analysis. Prerequisites: 3340 or consent of instructor. (Same as Linguistics 4450.)

4455 Varieties of English (3) Theories, methodologies, and findings of English and American dialectology with emphasis on implications for cultural pluralism. Prerequisite: 3330 or consent of instructor.

4460 Special Topics in English Linguistics (3) May be repeated with consent of department. (Same as Linguistics 4460.)

4471-81 English as a Second or Foreign Language (3, 3) 4471—Applied linguistics in teaching and learning English as a second or foreign language. 4472—Phonological and grammatical structure of present-day English. Analysis of differences (phonological, grammatical) between English and another language. Prerequisites: Second year of a foreign language. 4481—Materials and methods of language teaching. Analysis of materials and structured teaching situations. Theory of testing language competence and performance, with emphasis on construction of tests. Team teaching with an experienced member of the staff. Prerequisite: 4471. (Same as Linguistics 4471-81.) W, Sp.

4510-20-30 Black Literature (3, 3, 3) Trends and developments.

4551 Southern Literature through the Nineteenth Century (3) Southern writing from colonial period to end of nineteenth century, including frontier humorists and local color writers.

4552 Southern Literature in the Twentieth Century (3) Modern Southern literary renaissance, the Confederacy and Agrarian Faulkner and other great Southern writers such as Welty, O'Connor, and Porter.

4560 Emerson and Thoreau (3)

4580 American Humor through Mark Twain (3)

4721-31-41 Ballard and Folk tale (3, 3, 3) 4721—Study of traditional English and Scottish popular ballads and their North American variants; 4731—Study of native American ballad and folklore; 4741—The folk narrative; functions, categories, and patterns of storytelling.

4580 Milton (3) Emphasis on major poems.

4680 Seventeenth-century Prose and Poetry (3) Bacon and Donne to Marvell. A

4930-40 Chaucer (3, 3) 4930—The Canterbury Tales. 4940—Trollope and Crane and early poems.

5000 Thesis (1-15) E

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

5101 Foreign Study (1-12) See page 97.

5102 Off-campus Study (1-12) See page 97.

5103 Independent Study (1-12) See page 97. E

5110 Teaching Expository Writing (1) Using essays and personal experience as bases for Freshman Composition. Weekly sessions on how to prepare and teach such a course. Grading of sample papers; supervised teaching; observation of other sections. Required of all first-year Teaching Assistants. S/N only. F

5120 Teaching Writing about Literature (1) Variety of literary works as subjects for student response and analysis. Same format as 5110. S/N only. W

5130 Teaching Business and Technical Writing (1) Forms and strategies appropriate to memos, letters, abstracts, reports, and proposals. Same format as 5110. S/N only. W

5150 Old English Prose (3)

5170-80 History of the English Language (3, 3) 5170—Phonetische transcription, Old English, development of inflection and syntax. 5180—Middle and Early Modern English, development in pronunciation and vocabulary. F, W


5240 Readings in Black American Literature (3) Critical analysis of poetry, prose, drama, criticism;
French

See Romance Languages

Geography

MAJOR

DEGREES

Geography

M.S., Ph.D.

Professors:

S. R. Jumper (Head), Ph.D. Tennessee; C. S. Aiken, Ph.D. Georgia; E. H. Hammond, Ph.D. California (Berkeley); E. M. H. T. Nakamura, Ph.D. Syracuse; T. H. Schmudde, Ph.D. Wisconsin.

Associate Professors:

T. L. Bell, Ph.D. Iowa; L. W. Brinkman, Jr.; Ph.D. Wisconsin; J. R. Barker, Ph.D. Georgia; C. T. Poulton, Ph.D. Denver (UT Space Institute); J. B. Rehder, Ph.D. Louisiana State.

Assistant Professors:

R. Forrestal, Ph.D. Rutgers; L. Pulis, Ph.D. Southern Illinois; B. Ralston, Ph.D. Northwestern.

The Department of Geography offers the degrees of Master of Science and Doctor of Philosophy with concentrations in geography of development, physical geographic and human systems, urban geography, geography of Anglo-America, and rural and nonmetropolitan geography.

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours beyond completion of a sound undergraduate major program. At least one-half of the total courses in the graduate program must be at or above the 5000 level, of which no more than 9 hours may be thesis courses, and must include 5150, 5160, and (at each offering during residency) 5100. Thesis and final examination required.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those persons who demonstrate proficiency in conducting independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program of study must include sufficient course work within the department, but outside the areas of specialization, to give a broad foundation and understanding of the discipline. The program must include 5160, 5170, 5720, and (at each offering during residency) 5100. A minimum of 15 hours in credit must be earned in related fields outside the department. Emphasis in a foreign language, cartography, and quantitative techniques is required. Other techniques pertinent to the student's area of specialization may be required. The language will be French or German unless otherwise approved by the student's doctoral committee. Comprehensive examinations required for admission to candidacy include a written comprehensive examination, written examinations on two special fields, and an oral examination on the student's program, the special fields, and the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the program as determined by the student's doctoral committee.

3410 Intermediate Economic Geography (4) Concepts, theories, and practices in location planning, locational patterns in agriculture, manufacturing, and service activities. F or W

3430 Urban Geography (4) Concepts and theories concerning development and significance of systems of cities and internal morphology of cities. F or W

3450 Rural Geography (4) Geographical appraisal of rural areas of the United States, including small towns and urban fringes. Problems and potentials of rural America. F or W

3490 Geography of Resources (4) Study of factors related to variations in resource availability from time to time and from place to place, with particular emphasis upon energy and metallic resources. F or Sp

3520 Climatology (4) General circulation system leading to the weather and climate, climatic change and modification, interrelationship of climate and human activity. W or Sp

3530 The Land-Surface System and Man (4) Nature and regional variations in relationships among surface form, water, vegetation, and surface materials. Human as evaluator and agent of change. F, Su

3510 Political Geography (4) Importance of geographic factors for understanding potential of geographic relationships within and between nations; spatial implications of political decision-making process; geography of administrative units. F

3660 Cultural Geography (4) Basic concepts of culture; methods and background of cultural geography; world patterns of cultural phenomena. Sp

3790 Geography of Middle America (4) Covers Mexico, Central America, and the West Indies. F

3800 Geography of South America (4) W

3870 Geography of Asia (4) A survey of the physical, cultural, and economic characteristics of the countries of Asia, excluding the Soviet Union.

3910 Regional Geography of United States and Canada (4) Major physical, economic, and social distributions as they interrelate to give distinctive character to regions of United States and Canada. F

3920 Geography of the American South (4) Geographical appraisal of southeastern United States, including physical environment and human resources. Origin and development of contemporary economic and cultural traits of the area. W

3940 Geography of Appalachia (4) Interrelation of physical, economic, and social patterns to give distinctive character to the region and its parts, especially Southern Appalachia. Appalachia in perspective to the different American scene. F

4075 Geography of Transportation (4) Geographic examination of transportation systems, emphasizing transport of people on highways and by public facilities. Relationship of transportation systems to changing geography of cities and urban hinterlands. Sp

4100 Quantitative Methods in Geography (4) Geographic applications of statistical techniques, point pattern analysis and analysis of areal units. Prereq: Mathematics 3000 or consent of instructor. W

4210 Problems in Geographic Method (4) Examples of problems and approach in geographic analysis and synthesis. Emphasis on methodological use of geographic data, areal sampling, generalization, classification, regionalization, and questions of scale.

4240 Historical Geography of the United States (4) Survey of changing human geography of United States during four centuries of settlement and development. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development. Sp

4510 Principles of Geomorphology (4) (Same as Geology 4510.)

4550 Geography of Soils (4) Soils as physical systems and their relationship to environments. Investigation of specific cases of the role of soil in management of environmental systems.
4510 Industrial Geography (4) Factors affecting location of manufacturing activities, with emphasis on the United States. Prereq: 3410 or consent of instructor. A

4630 Geography of Agriculture (4) A

4710 Cartographic Design and Production (4) Principles and practice of design, construction, and reproduction of maps. Recommended prereq: 3700. 2 hrs and 2 labs.

4720 Data Mapping (4) Automated techniques of representing surfaces, using geographic information systems. Recommended prereq: 3700 and knowledge of a computer language. F

4730 Advanced Cartography (4) Map production from design through color proofs. Prereq: 3700, 4710, and 4720 or consent of instructor. Su

4740 Remote Sensing: Types and Applications (4) Basic principles and uses of aerial photography and other remote sensing techniques. Emphasis upon use of various types of imagery for geographic interpretation and simple mapping. Prereq: Consent of instructor. F or Sp

4750 Interactive Computer Graphics (3) (Same as Computer Science 4750.)

4799 Practicum in Cartography-Remote Sensing (2-6) May be repeated. Maximum 8 hrs. E

5000 Thesis (1-15) E

5100 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration at each offering required of resident graduate students. May be repeated. Maximum 8 hrs. S/N/C only. W, Sp

5101 Foreign Study (1-12) See page 97. E

5102 Off-campus Study (1-12) See page 97. E

5150 Introduction to Geographical Research (3) Aims of geographical research; survey of printed source materials; practice in effective presentation of research findings. F

5156 Research Design and Field Problems (4-6) Development of research problems, preparation of appropriate study designs, and practical field application. Su

5170 Geographic Concept and Method (2) Traditional and modern thought regarding nature, scope, problems, and methods of geography. A

5200 Special Problems in Geography (2-6) Reading and research on problems or topics of interest to individual students. Students must define topics and receive instructor's approval of study plan before registering for course. May be repeated with consent of instructor. E

5250 Topics in Historical Geography (3) Examination of trends, concepts and methods in historical geography. Prereq: 4240 or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5260 Advanced Cultural Geography (3) Geographical analysis of rural settlement in Eastern United States, with emphasis upon New England, Tidewater East, and Upland South, and specific application to Southern Appalachians. Includes field work and final paper. Prereq: 3560 or consent of instructor. A

5310 Topics in Regional Geography of the United States (3) An intensive analysis of problems and trends in one or more regions of the United States, excepting American South. May be repeated with consent of instructor. Maximum 9 hrs. A

5320 Topics in the Geography of the American South (3) Geographical perspective on economic and cultural aspects of southeastern United States. Topics vary. May be repeated with consent of instructor. Maximum 9 hrs. A

5410 Advanced Topics in Economic Geography (3) Examination of trends, problems, and methods in modern economic geography. Prereq: 3410 or consent of instructor. May be repeated. Maximum 9 hrs. A

5520 Advanced Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq: 3430 or consent of instructor. A

5550 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methods in geography of land-surface system. Prereq: 3520 or consent of instructor. May be repeated with consent of instructor. A

5610 Topics in Climatology (3) Examination of trends, problems, and methods in modern climatology. Prereq: 3520 or consent of instructor. May be repeated with consent of instructor. A

5710 Seminar in Geography (3)

5720 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate packaged computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 4100 or consent of instructor. Sp

5740 Advanced Topics in Remote Sensing (3) Applied research using remote sensing and aerial photographic imagery for interpretation and mapping of geographic data. Prereq: 4740 or consent of instructor. A

5790 Topics in Cartography (3) Trends, concepts, problems, and methods in cartography. Prereq: 3730, or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5915 Regional Geomorphology (4) (Same as Geology 5915.)

6000 Doctoral Research and Dissertation (3-15) E

6110-20 Seminar in Economic Geography (3, 3) A

6220-30 Seminar in Urban Geography (3, 3) A

6240-50 Seminar in Historical Geography (3, 3) A

6260-70 Seminar in Cultural Geography (3, 3) A

6310-20 Seminar in Rural Geography (3, 3) A

6410-20 Seminar in Regional Geography of the United States (3, 3) A

6510-20 Seminar in Regional Geography of Latin America (3, 3) A

6710-20 Seminar in Physical Geography (3, 3) A

NOTE: Registration in 6000-level courses may be repeated with consent of department.

Geological Sciences

MAJOR

Geology

DEGREES

M.S., Ph.D.

Professors:

K. R. Walker (Head), Ph.D. Yale; H. J. Klepeis (Emeritus), Ph.D. Ohio State; O. C. Kopp, Ph.D. Columbia; R. E. McLaughlin, Ph.D. Tennessee; L. A. Taylor, Ph.D. Lehigh; J. G. Wails (Emeritus), Ph.D. North Carolina.

Associate Professors:


Assistant Professors:


THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours including at least 18 hours in courses (other than thesis) numbered above 5000. A minimum of 24 hours in Geography courses, in addition to thesis, is required. Students who enroll without having had an acceptable field camp are required to take Geology 4440, or an equivalent course elsewhere, as part of the above department requirements. One year of general physics is required, if not taken as an undergraduate. Thesis committee and topic must be approved by graduate program committee. Qualifying examination is given the second quarter.

THE DOCTORAL PROGRAM

Specific course program and thesis topic determined by candidate’s faculty committee.

1. Program to be determined by faculty committee. Requirements include a minimum of 84 quarter hours in courses for graduate credit, in addition to dissertation. These courses must include at least 15 hours in the 5000 or 6000 series, of which at least 15 hours must be in the 6000 series. Up to one-third of the required hours may be taken in related fields. A Master's degree is required.

2. Comprehensive examination will be both written and oral. The exam must be taken by the end of the second academic year.

3. Each Ph.D. student must satisfy a research tool requirement which will be determined by his/her faculty committee and which will consist of one of the following:

a. Demonstration by examination of a reading knowledge in one modern foreign language in which there is a significant body of geological literature.

b. Completion of course 3030 in an appropriate foreign language with a B or better.

c. Courses (minimum of 6 hours) at 3000 level or higher taken for undergraduate credit and completed with a B average in appropriate mathematics, statistics, or computer science courses. The courses must include at least one during a student’s graduate program and must be approved by the student’s entire committee.

In no case will option c above be available unless the student has had reading training as a college undergraduate in an appropriate foreign language.

*3160 Introduction to Earth Materials (4) Study of minerals and rocks. Laboratory includes both hand specimen and analytical methods of identification. Prereq: 1410. 2 hrs and 2 labs.

*3180 Mineralogy (4) Introduction to crystallography and study of mineralogy including the study of hand specimen, chemical and x-ray methods of identification. Prereq: 1400 or Chemistry 1110-20 or equivalent. 3 hrs and 1 lab. A

*3210-20 Invertebrate Paleontology (4, 4) Systematic review of important Metazoa invertebrate fossils. 3210—Porteria to Annelida, including cnidarians, echinoderms, decapods, and chelicerates. 3220—Mollusca through lesser Chordata, including arthropods and echinoderms. May be taken separately or in sequence. Prereq: 3260; Biology 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

*3260 Paleobiology (4) Introduction to principles and morals of paleontology as applied to interpretation of earth history. Prereq: 1420. 3 hrs and 1 lab or field period. A

*3270 Geological History of Land Organisms (4) Geological history and development of terrestrial biota and ecosystem with special emphasis on fossil record of land plants and vertebrates. Prereq: Biology 1210-20 or consent of instructor. 3 hrs and 1 lab or field period. A

*3310 Introductory Petrology (4) Introduction to classification and properties of igneous and metamorphic rocks, processes which produce them, and techniques used in interpreting rocks. Laboratory emphasizes both hand specimen and microscopic study of important rock types. Prereq: 3180. 3 hrs and 1 lab.
*3330 Geology of East Tennessee (4) Lectures and field excursions. Prereq: 12 hrs of geology and consent of instructor.

*3360 Stratigraphy-Sedimentation (4) Introductory study of stratigraphic principles and practices and of sedimentary processes and interpretation of depositional environments. Prereq: 1450 and 3160. 3 hrs and 1 lab or field period. A

*3370 Structural Geology (4) Introductory discussions of folds, faults, joints, cleavage, and primary structures. Laboratory work includes depth and thickness problems, structure sections, structure contour maps. Prereq: 1420. Mathematics 1840-50 or equivalent. 3 hrs and 1 lab or field period.

*3410 Principles of Ground Water Geology (3) Geological and materials and processes affecting the occurrence and behavior of water. 2 hrs and 1 lab.

*3510 Introductory Environmental Geology (4) Geologic problems involving environments and resources, and geologic parameters associated with their control and misuse. Prereq: 1420 or consent of instructor. 2 hrs and 2 labs or field periods.

*3510 Quantumay Geology for Engineers (3) Erosional and depositional processes, landforms, ground water. Prereq: 2610 or equivalent. 2 hrs and 1 lab.

4110 Principles of Economic Geology (4) Formation of mineral deposits, classification, characterization and origin of different types of mineral deposits, economic geology concepts. Prereq: 3180. 3 hrs and 1 lab.

4115 Elementary Applied Geophysics (4) Basic principles of electrical, seismic, gravity and magnetic surveying. Recommended: 1420. Physics 2250 or 2320. 3 hrs and 1 lab.

4130 Sedimentology (4) Introduction to physical processes of sedimentation: transport of sediments and formation of sedimentary structures, river flows, waves, tides, and ocean circulation. Prereq: 3110. 3 hrs and 1 lab.

4230 Paleocology (4) Principles of environmental analysis applied to fossil assemblages and associated lithologies. Prereq: 3260 or consent of instructor: 3 hrs and 1 lab.

4240 Paleobotany (4) Survey of fossil record of plants with particular emphasis on comparative morphology and evolutionary trends in major plant groups, and chronological succession and geographic distribution of past floras on earth. Prereq: 1420 or 2210; Botany 2010-20 or consent of instructor. 3 hrs and 1 lab period.

4250 Evolution of Higher Taxa (4) Current evolutionary theory in context of paleontology, patterns of evolution in fossil organisms and a new approach to interpretation of physical and biological phenomena directly or indirectly influenced by Pleistocene glaciation. Prereq: Elements of geology (3 quarters) or consent of instructor. (Same as Botany 4750 and Zoology 5290.)


5130 Geophysics—Seismic Exploration Methods (4) Seismic reflection and refraction methods, introduction to earthquake seismology and earth's interior. Prereq: 4115 or consent of instructor. 3 hrs and 1 lab.

5210-20-30 Special Problems in Geology (1-4, 1-4, 1-4)

5290 Quantumay Problems (4) Interdisciplinary approach to interpretation of biological and geological phenomena directly or indirectly influenced by Pleistocene glaciation. Prereq: Elements of geology (3 quarters) or consent of instructor. (Same as Botany 5290 and Zoology 5290.)

5310 Depositional Environments and Models for Exploration (4) Modern depositional environments and recognition of ancient analogs; tectonic applications. 3 hrs and 1 lab period.

5340 Seminar in Local Stratigraphy (1) Stratigraphy of Knoxville area.

5350 Selected Topics In Geology (1) Presentation of graduate research, topics from current literature, and subjects of general interest. Registration required each quarter except summer for resident full-time graduate students. S/N only.

5370 Mesofabric Analysis (4) Techniques of gathering, processing, and interpreting tectonic mesoscopic fabric data. Prereq: 3379. 3 hrs and 1 lab or field period.

5460 Photogeologic Interpretation (4) Advanced photogrammetric techniques to obtain geological information from aerial photographs. Practice in interpretation of imagery covering selected covered geologic features. Prereq: Consent of instructor.

5470 Plate Tectonics and Orogeny (4) Geometry and kinematics of plate motion are used to devise models for orogenesis, cold belts, metamorphic and plutonic belts, with recent and ancient examples. Prereq: 3379. 3 hrs and 1 lab or field period.

5520 Igneous Petrology (4) Genesis and emplacement of magma, and mineralogical, chemical, and textural properties of resulting igneous rocks. Laboratory emphasizes petrographic description and classification of rocks in thin section. Prereq: 3310 and 4550. 2 hrs and 2 labs.

5530 Metamorphic Petrology (4) Physical and chemical characteristics of metamorphic environment, and effects on texture, chemical composition, and mineral equilibria. Laboratory emphasis petrographic description and interpretation of metamorphic rocks in thin section. Prereq: 3310 and 4550. 2 hrs and 2 labs.

5540 Terrigenous Clastic Sedimentary Petrology (4) Field and microscopic analysis of terrigenous clastic rock types, role of transport and depositional processes in affecting sediment texture and composition. Prereq: 3360 or equivalent. 3 hrs and 1 lab.

5550 Carbonate Sedimentary Petrology (4) Environments of deposition of modern and ancient carbonates.
Germanic and Slavic Languages

MAJORS

DEGREES

M.A. M.ACT

German

German Language and Literature

Emeritus Professors:

H. W. Fuller, Ph.D. Wisconsin; E. T. Hankamer, Ph.D. Born (Germany); R. L. W. Nordseeck, Ph.D. Ohio State.

Professors:

H. Kratz (Head); Ph.D. Ohio State; J. E. Fahlen, Ph.D. Pennsylvania; R. L. Hiller, Ph.D. Cornell; J. C. Osborne, Ph.D. Northwestern; M. P. Rice, Ph.D. Vanderbilt.

Associate Professors:

J. L. Elliott, Ph.D. Michigan; D. M. Fane, Ph.D. Indiana; N. A. Lauckner, Ph.D. Wisconsin; D. E. Lee, Ph.D. Stanford; C. J. Meifert, Ph.D. Chicago.

Assistant Professor:

U. Ritzenhoff, Ph.D. Connecticut.

The Department of Germanic and Slavic Languages offers three advanced degrees. They are the Master of Arts (M.A.) in German, the Master of Arts in College Teaching (MAC) in German, and the Doctor of Philosophy (Ph.D.) in German Language and Literature.

THE MASTER'S PROGRAM

In addition to the general Graduate School requirements as stated on page 18, the department requires 36 quarter hours in approved courses, including at least 18 hours in courses numbered above 5000. In addition to course work, the student is required to write a thesis, for which he/she may get a maximum of 9 hours credit. The minimum quarter hour credit for the M.A. is 45 quarter hours.

MASTER OF ARTS IN COLLEGE TEACHING PROGRAM

The MAC program is essentially an expanded M.A. program. The minimum requirement is 60 hours of graduate study, including 9 hours of thesis and a 3-quarter-hour seminar in college teaching. The aim of this program is to prepare highly qualified college teachers. Students receiving the MAC degree would be well prepared to go to the Ph.D.

THE DOCTORAL PROGRAM

The student must fulfill the general requirements for the Ph.D. degree set by the Graduate School. The candidate for the Doctoral degree must complete a minimum of 81 quarter hours of course work beyond the Bachelor's degree in addition to 36 hours of doctoral research and dissertation. At least 45 quarter hours of the minimum must be taken in 5000 or 6000 courses. Of these 45 hours, a minimum of 18 hours must be chosen from the prosemirum (5200) and the literary or philologica1 seminars (6210-20-30-40-50-60 and 6310-20-30-40-50-60). Any course must be taken in a cogitate field. Students are encouraged to take additional work in allied fields. A minor in an allied field must consist of at least 18 hours of 5000 or 6000 courses. Students must show a fluent command of German, both oral and written, and a knowledge of two foreign languages, French and another language, such as Italian, Latin or Russian, appropriate to the field of research. A comprehensive examination, both written and oral, on German language and literature and the minor field or fields, must be passed before the student is admitted to candidacy. The student will be examined on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. The candidate will be required to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the dissertation as a final test of the candidate's scholarly qualifications.

The field of study is divided into (1) German literature and (2) German (or Germanic) philology or linguistics. A student may concentrate on one or the other. Dissertation and seminar research topics will be chosen in accordance with the varying preferences and specific interests of the faculty. Detailed programs will be established in each case by the student's faculty committee.

3010-25-30 Elements of German for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language exarnination, and to upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for students having completed Elementary German.

3210-23-30 German Literature in English Translation (3-4, 3-4) No foreign language credit. No change in credit hours after add deadline. Students opting for 4 hrs credit will be expected to present an appropriate amount of extra work above that required for 3 hrs. F, W, Sp.

3240 Old Norse Literature in English Translation (3-4) Prose readings of sagas of Norwegian kings, great Icelandic family sagas, and Vindland sagas, narrating discovery of America around year 1000. Mythological and heroic poems of the Edda.

4110-25-30 Studies in Classical and Modern Writings (3, 3, 3) The MAC program requires 9 hrs of 3010-20-30 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. May be repeated with consent of department.

4140-50 Selected Topics in German Literature from 1750 to the Present (3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examination, and to upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for students having completed Elementary German.

4160 Studies in German Authors (3) Life and works of a single outstanding German literary figure. Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. Su.

4310 Studies in German (3) Advanced German. Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. May be repeated. Su.

4710 Theatrical German (1-3) Performance in one or more German plays. Prereq: Intermediate German or equivalent or consent of instructor. May be repeated with consent of department. W, Sp.

4210-25-30 Studies in German Literary Types (3, 3, 3) 4210-25-30: Narrave prose. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30, 3310) or equivalent. 

4250 Introduction to Descriptive Linguistics (3) Same as French, Russian, Spanish, and Linguistics 4250. F

4260 Introduction to Historical and Comparative Linguistics (3) Linguistic change, protolanguages. Phonological and morphological change. Cultural, historical, sociological influences upon the development of language. Semanic lexicography.
or consent of department. F; W; Sp

4610-20-30 German Civilization (3, 3, 3)
Prereq: 4310-20-30 History of German Language (3, 3).

sive of German and French 3010-20-30, courses in
sion courses in a modern or ancient language (exclu-
hrs of upper division English, or 9 hrs of upper divi-
amples from Indo-European languages . Prereq : 9

11 8 College of Liberal Arts

trative problems; preparation of papers. F

selected topics in German grammar. For teachers

(3) Advanced work in phonetics, pronunciation, and

5000 Thesis (1-15) E

German of eighth and ninth centuries. Dialects. Rep-

6120-30 Old High German (3, 3) 6120-Introduc-

relationships and approved

and literary point of view. Development of language
in Old High German period.

6140 Old Saxon (3) Phonology, morphology, and
syntax of Old Saxon. Representative readings.

10-30-40-50-60 Seminar in German Litera-
ature (3, 3, 3, 3, 3) May be repeated. E

710-30 Seminar in German and Germanic
Philology (3, 3, 3) May be repeated. E

Russian

3010-20-30 Elements of Russian for Graduate
Students and Seniors (3, 3, 3) For graduate stu-
dents preparing for language examinations and
seniors desiring reading knowledge of a second for-
guage. Prereq: 2 years of some foreign lan-
guage in college or consent of department. Under-
graduate credit only. No credit for students having
completed 1 yr of Elementary Russian.

3210 Nineteenth-century Russian Literature in
English. (3) War and Peace, Anna Karenina, and
other works.

3220 Works of Leo Tolstoy in English Translation
(3-4) War and Peace, Anna Karenina, and
other works.

3221 Works of F. M. Dostoevsky in English
Translation, Crime and Punishment, Broth-
Karamazov and other works.

3230 Twentieth-century Russian Literature in
English Translation (3-4) Russian modernism and
literature under the soviets.

3240 The Russian Drama in English Translation
(3-4) Selections from works of Fontann, Grid-
Pushkin, Gogol, Ostrovsky, Turgenev, Chekhov, and
others.

3250 The Works of Ivan Turgenev and Anton
Chekhov in English Translation (3-4)

3260 Russian Folklore in English Translation
(3-4)

3270 Russian Philosophical and Theological
Thought (4) A survey of the development of philo-
sophical and theological thought in Russia from the
Middle Ages to the Revolution. Special emphasis on
the expression of this thought in Russian literature
and literary criticism. No knowledge of Russian re-
qured. (Same as Philosophy 3270 and Religious
Studies 3260.)

4010 Selected Topics in Russian and East Europe-
pean Studies (3) Interdisciplinary seminar on
selected topic using comparative approach.

4110-20-30 Studies in Major Russian Writers
(3, 3, 3) Content varies. Pushkin, Lermontov, Gogol,
Turgenev, Tolstoy, Dostoevsky, Chekhov, and
others. Prereq: 9 hrs of 3000 courses (exclusive of
3010-20-30, 3210-20-30-40-50-60-70, 3310) or
equivalent. May be repeated.

4210-20-30 Studies in Russian Literary Periods
(3, 3, 3) 4210—Russian Romanticism. 4220—Ru-
sian Realism. 4230—Russian Modernism. Prereq: 9
hrs of 3000 courses (exclusive of 3010-20-30, 3210-
20-30-40-50-60-70, 3310) or equivalent.

4250 Introduction to Descriptive Linguistics (3)
(Same as French, Spanish, Linguistics, and German
4250.) F

4260 Introduction to Historical and Comparative
Linguistics (3) As in French, German, Spanish,
and Linguistics 4260.) W

4271 Introduction to Slavic Linguistics (3)
(Same as Linguistics 4271.)

4310-30 Advanced Studies in Russian
Language (3, 3, 3) Intended primarily for students
majoring or minorin Russian who are interested in lan-
guage and linguistics. Includes problems in morphol-
gy and syntax, stylistics and translation techniques,
and history of Russian language as well as other
special problems for advanced students of Russian.
May be repeated. Maximum 9 hrs each.

4410-20-30 Directed Readings in Russian (3, 3, 3)

and literary point of view. Development of language
in Old High German period.

6140 Old Saxon (3) Phonology, morphology, and
syntax of Old Saxon. Representative readings.

10-30-40-50-60 Seminar in German Litera-
ature (3, 3, 3, 3, 3) May be repeated. E

710-30 Seminar in German and Germanic
Philology (3, 3, 3) May be repeated. E

Russian

3010-20-30 Elements of Russian for Graduate
Students and Seniors (3, 3, 3) For graduate stu-
dents preparing for language examinations and
seniors desiring reading knowledge of a second for-
guage. Prereq: 2 years of some foreign lan-
guage in college or consent of department. Under-
graduate credit only. No credit for students having
completed 1 yr of Elementary Russian.

3210 Nineteenth-century Russian Literature in
English. (3) War and Peace, Anna Karenina, and
other works.

3220 Works of Leo Tolstoy in English Translation
(3-4) War and Peace, Anna Karenina, and
other works.

3221 Works of F. M. Dostoevsky in English
Translation, Crime and Punishment, Broth-
Karamazov and other works.

3230 Twentieth-century Russian Literature in
English Translation (3-4) Russian modernism and
literature under the soviets.

3240 The Russian Drama in English Translation
(3-4) Selections from works of Fontann, Grid-
Pushkin, Gogol, Ostrovsky, Turgenev, Chekhov, and
others.

3250 The Works of Ivan Turgenev and Anton
Chekhov in English Translation (3-4)

3260 Russian Folklore in English Translation
(3-4)

3270 Russian Philosophical and Theological
Thought (4) A survey of the development of philo-
sophical and theological thought in Russia from the
Middle Ages to the Revolution. Special emphasis on
the expression of this thought in Russian literature
and literary criticism. No knowledge of Russian re-
qured. (Same as Philosophy 3270 and Religious
Studies 3260.)

4010 Selected Topics in Russian and East Europe-
pean Studies (3) Interdisciplinary seminar on
selected topic using comparative approach.

4110-20-30 Studies in Major Russian Writers
(3, 3, 3) Content varies. Pushkin, Lermontov, Gogol,
Turgenev, Tolstoy, Dostoevsky, Chekhov, and
others. Prereq: 9 hrs of 3000 courses (exclusive of
3010-20-30, 3210-20-30-40-50-60-70, 3310) or
equivalent. May be repeated.

4210-20-30 Studies in Russian Literary Periods
(3, 3, 3) 4210—Russian Romanticism. 4220—Ru-
sian Realism. 4230—Russian Modernism. Prereq: 9
hrs of 3000 courses (exclusive of 3010-20-30, 3210-
20-30-40-50-60-70, 3310) or equivalent.

4250 Introduction to Descriptive Linguistics (3)
(Same as French, Spanish, Linguistics, and German
4250.) F

4260 Introduction to Historical and Comparative
Linguistics (3) As in French, German, Spanish,
and Linguistics 4260.) W

4271 Introduction to Slavic Linguistics (3)
(Same as Linguistics 4271.)

4310-30 Advanced Studies in Russian
Language (3, 3, 3) Intended primarily for students
majoring or minorin Russian who are interested in lan-
guage and linguistics. Includes problems in morphol-
gy and syntax, stylistics and translation techniques,
and history of Russian language as well as other
special problems for advanced students of Russian.
May be repeated. Maximum 9 hrs each.

4410-20-30 Directed Readings in Russian (3, 3, 3)
2. Residence and Course Work: Beyond the Bachelor's degree a minimum of 75 credit hours in course work is required, of which not less than 45 must be in courses that are numbered over 5000. Not less than 6 quarters of the required 9 quarters of residence work shall be under the supervision of the staff of The University of Tennessee.

3. Language Requirements: Candidates must possess a reading knowledge of one foreign language and such additional languages as may be determined by the student's committee. Under normal circumstances, those specializing in European history will need two languages. The committee may also specify any other research tools, such as statistics, essential for the student's preparation. Upon student petition, the committee may accept in place of a language a B or better performance in appropriate statistical courses and History 5290.

4. Foreign language requirements may be satisfied in one of two ways:

(a) By examination. When the student is ready to take a language examination he/she should consult with an advisor. The appropriate sequence and the time of the examination may be obtained from the Graduate School.

(b) By course work. Upon consultation with the advisor, a student may elect to complete an appropriate 3010-20-30 sequence in a language department (or an intermediate sequence in a language in which no 3010-20-30 sequence is available.) Satisfactory completion requires that a student must have at least a B in the final quarter.

4. Comprehensive Examination and Committee: Incoming students will be advised by the department head. The comprehensive examination must be taken after all course work is completed, language requirements fulfilled, and at least nine months before the degree is expected. The exam should normally be taken before the ninth quarter of work toward the degree.

The comprehensive examination will be both written and oral.

5. Dissertation and Final Examination: Original research forms the basis for the dissertation. After the dissertation has been completed, a final oral examination will be given on the dissertation in its historical context.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3060-70-80</td>
<td>History of Western Religious Thought and Institutions (3, 3, 3) (Same as Religious Studies 3060-70-80.)</td>
</tr>
<tr>
<td>1</td>
<td>3140-50-60</td>
<td>History of England (3, 3, 3) 3140—To 1668. 3150—1668 through the Reform Bill of 1832. 3160—1832 to the present.</td>
</tr>
<tr>
<td>2</td>
<td>3311-21</td>
<td>History of Tennessee (3, 3) 3311—Eighteenth Century to Civil War Era. 3321—1865 to present.</td>
</tr>
<tr>
<td>2</td>
<td>3411-12</td>
<td>The Reformation (3, 3) 3411—Renaissance. 3412—Reformation, Counter Reformation, and Wars of Religion. 1517-1618. (Same as Religious Studies 3411-12.)</td>
</tr>
<tr>
<td>2</td>
<td>3445-46</td>
<td>History of France (4, 4) 3445—To 1785. 3446—Since 1781.</td>
</tr>
<tr>
<td>2</td>
<td>3470-80-90</td>
<td>History of Russia (3, 3, 3) 3470—To 1801. 3480—Nineteenth Century. 3490—Twentieth Century.</td>
</tr>
<tr>
<td>2</td>
<td>3510-20</td>
<td>The American Colonies and the American Revolution (3, 3) 3510—Settlements to 1754. 3520—1754-1789.</td>
</tr>
<tr>
<td>2</td>
<td>3710-20-30</td>
<td>History of Germany (3, 3, 3) 3710—First Reich to 1713. 3720—Habsburg and Hohenzollern and Formation of Second Reich, 1713-1890. 3730—From a unified to a divided Germany, 1890 to present.</td>
</tr>
<tr>
<td>2</td>
<td>3740</td>
<td>The City in Europe, ca. 1200-1900 (3) Survey of European urban growth, with comparative analysis of the major periods of urbanization of the thirteenth and nineteenth centuries. Emphasis on the relationship between demographic, economic and social foundations of cities and political and cultural development.</td>
</tr>
<tr>
<td>2</td>
<td>3751-52</td>
<td>Ancient Near Eastern Civilization (3, 3) 3751—Early and Middle Bronze Ages. 3752—Late Bronze and Iron Ages.</td>
</tr>
<tr>
<td>2</td>
<td>3760-70</td>
<td>The Ancient World (3, 3) 3760—Greece. 3770—Rome.</td>
</tr>
<tr>
<td>3</td>
<td>3780-90</td>
<td>History of the Middle East (3, 3) 3780—Rise and spread of Islamic Civilization to the 16th Century. 3790—The impact of the West on the Middle East from the sixteenth century to World War I.</td>
</tr>
<tr>
<td>3</td>
<td>3795</td>
<td>Contemporary Middle East (4) Background of current problems in the area, from World War I to present.</td>
</tr>
<tr>
<td>3</td>
<td>3800</td>
<td>North Africa Since 1830 (3) Morocco, Algeria, Tunisia, and Libya in the nineteenth and twentieth centuries.</td>
</tr>
<tr>
<td>3</td>
<td>3810-20-30</td>
<td>History of East Asia (3, 3, 3) 3810—Traditional China and Japan, ancient to mid-nineteenth century. 3820—Modern China, Japan, and Korea, mid-nineteenth century to 1900s. 3830—Contemporary China, Japan, and Korea, 1900s to present.</td>
</tr>
<tr>
<td>3</td>
<td>3870-80-90</td>
<td>History of Latin America (3, 3, 3) 3870—Exploration, conquest settlement and Colonial life to 1800. 3880—Major countries of South America, 1800 to present. 3890—Mexico, Central America and the Caribbean, 1900 to present.</td>
</tr>
<tr>
<td>3</td>
<td>4015</td>
<td>Studies in History (3-4) Variable content course affording opportunity to offer subject matter not covered in an existing course. May be repeated.</td>
</tr>
<tr>
<td>3</td>
<td>4120-30</td>
<td>History of Colonialism and Imperialism (3, 3) 4120—Background; age of discovery and exploration to nineteenth century. 4130—Nineteenth Century.</td>
</tr>
<tr>
<td>3</td>
<td>4250-65-70</td>
<td>European and Cultural History (3, 3, 3) 4250—From Reformation to the Scientific Revolution, 1500-1700. 4260—From the Enlightenment to Wars of P. O. Realism, 1700-1870. 4270—From Subjectivism to Relativism, 1870-present.</td>
</tr>
<tr>
<td>3</td>
<td>4280</td>
<td>Women in European History (4) Comparative analysis of role and image of women in Medieval, Renaissance, and Victorian periods. Attention given to parallel changes in structure of family as well as relationship between Western Culture and women's protest movements.</td>
</tr>
<tr>
<td>3</td>
<td>4290</td>
<td>Women in American History (4) Approaches of 4290 applied to American Society.</td>
</tr>
<tr>
<td>3</td>
<td>4310-20-30</td>
<td>History of American Foreign Relations (3, 3) 4310—To Revolution, 1901. 4320—1901-1941. 4330—1941 to present.</td>
</tr>
<tr>
<td>3</td>
<td>4350</td>
<td>The United States in World War II (4) Military, diplomatic, and domestic experience.</td>
</tr>
<tr>
<td>3</td>
<td>4370</td>
<td>U.S. Military History, 1754 to the Present (4) Examination of nation's broad strategic aims and means used to attain them, shifting strategy, tactics and weaponsry involved in our wars, and relationship between American society and its armed forces.</td>
</tr>
<tr>
<td>3</td>
<td>4380</td>
<td>Civilian-Military Relationships in the Modern Western World (3) Civilian-military affairs from about 1900 to 1960 in Western Europe, Russia and America; emphasis in Western Europe e.g., Dreyfus Affair, Army in Nazi Germany, and Truman-MacArthur controversy.</td>
</tr>
<tr>
<td>3</td>
<td>4410-20-30</td>
<td>Europe in the Twentieth Century (3, 3) 4410—To 1919. 4420—1919-1939. 4430—1939 to present.</td>
</tr>
<tr>
<td>3</td>
<td>4470</td>
<td>Poland and Its Neighbors (3) A survey of Polish history from its beginnings to present with some emphasis on the Polish question within context of modern international affairs.</td>
</tr>
<tr>
<td>3</td>
<td>4480</td>
<td>Russian Intellectual History (3) From eighteenth century to present, emphasizing problems of Westernization, nationalism, and revolutionary tradition.</td>
</tr>
<tr>
<td>3</td>
<td>4490</td>
<td>Soviet Foreign Policy (3)</td>
</tr>
<tr>
<td>3</td>
<td>4500</td>
<td>History of Medieval England (3)</td>
</tr>
</tbody>
</table>

College of Liberal Arts 119
THE MASTER'S PROGRAMS

The Master of Arts degree and the Master of Science degree are designed to prepare students for industrial employment and for teaching at the high school and junior college level.

The department offers two options for these degrees. The first option requires a thesis for which 9 hours must be earned along with 36 additional hours of work in acceptable courses numbered above 4000. Of the additional hours, 5 may be in an area outside the department and 18 must be in courses in mathematics numbered above 5000.

After two quarters of graduate study, a student whose supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 4000 are required. Of these, 27 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the 45 hours, 15 in courses approved by the supervisory committee may be taken in fields other than mathematics. For this option it is also required that a written comprehensive examination be passed, and that credit be received for a 3-hour seminar or reading course (5990-5995) in which a term paper or project is required.

A student offering mathematics as a minor for the Master's degree is required to obtain at least 9 hours of resident graduate credit in courses numbered above 4000 and approved by both the major department and the Department of Mathematics.

THE DOCTORAL PROGRAM

For the Ph.D. in Mathematics, the student must meet the following departmental requirements:

1. Pass written examinations covering four subjects, at least three of which must be from the following list:
   a. Algebra 5510-20-30
   b. Functions of a Complex Variable
   c. Topology 5910-20-30
   d. Functions of a Real Variable
   e. Linear Analysis
   f. Partial Differential Equations 5450-60-70
   g. Ordinary Differential Equations
   h. Numerical Mathematics
   i. Mathematical Statistics

   Students may not take examinations in both d. and e. nor may they take examinations in both f. and g. as their comprehensive examination subjects. Those students who choose four from this list must choose two from a. through e. Students who choose only three from this list must choose one from a. to e.

   A student selecting only three from the above list will also be required to pass a written examination in an area of applied mathematics (e.g., Fluids, Elasticity, Mathematical Ecology) approved as an examination topic for that student by the Graduate Committee and the Applied Mathematics Committee. For a given student and a given area, the Graduate Committee will appoint a section of faculty whose responsibility is to submit a list of topics and references to the Graduate Committee on the Applied Mathematics Committee for its approval.

   A student may take as many of the written examinations as desired at any time these exams are given subject to the following conditions:
   a. The exams to be taken must be approved in advance by the student's supervisory committee.
   b. At most 4-exams may be taken at any one time, where n denotes the number of exams previously passed by the student.

   c. A student may take a collection of written examinations a maximum of four times, but no one failing five exams, counting possible repetitions, will be permitted to take another round of exams.

   2. Pass an intensive exam in the field of specialization. This exam will be given by a committee appointed by the department head at some time after the requirements in 1. have been met. A student may take this specialty exam only twice.

   3. The conditions for the doctoral degree are to include a demonstrated proficiency in one foreign language normally from among French, German, or Russian; this requirement is to be met prior to the examination in the area of specialization. The student's doctoral committee may require that the student pass a second language exam.

   In addition, the department requires that each student take a one year, 6000-level course in mathematics outside of his/her area of concentration. The use of the course selected to fulfill this requirement must be approved by the department head and the student's Doctoral Committee. (Such approval may occur after completion of the course.)

   The written exams mentioned in 1. are normally given twice each year, once in the fall and once in the winter. The fall exams usually are given before the fall quarter begins, and the winter exams are given early in January.

   *3050 Elementary Probability and Statistical Analysis
   *3060 Elementary Statistical Analysis

   3050 Polynomials and Rings
   *3110 Real Number System
   *3155 .)
   *3120 Logic and Sets
   3130 Mathematical Modeling

   3140 Mathematical Modeling

   3150 Introduction to Numerical Algorithms and Programming

   3155 Introduction to Numerical Algorithms and Programming

   *These courses are sometimes offered in special summer institutes for an 8-week period with 4 hrs credit: Such special courses are designated 3615, 3616, etc.
4070 Matrix Algebra and Applications (3) Topics to be chosen at discretion of instructor.

4120 Linear Algebra (3) Abstract vector spaces, linear transformations, eigenvalues and eigenvectors, similarity and diagonalization, systems of linear equations and determinants, inner products, and diagonalization of symmetric matrices. Prereq: 2860 or 4050.

4150-60 Abstract Algebra (3, 3) Equivalence relations and partitions, elementary theory of groups and rings, polynomial rings, integral domains, divisibility, unique factorization domains, fields. Must be taken in sequence. Prereq: 2860. W, Sp

4225 Numerical Solution to Equations and Numerical Approximations (3) Numerical solution to equations and numerical approximations. Introduction to computation, instabilities, rounding errors. Solution of a single nonlinear equation; introduction to iterative methods for linear and nonlinear systems. Polynomial equations; power and inverse power methods for eigenvalues. Approximation by polynomials, piecewise polynomials, trigonometric and rational functions. Prereq: 3150 or 3155. (Same as Computer Science 4225.) F, W


4250-60 Introduction to Complex Analysis (3, 3) Cauchy's theorem, Taylor and Laurent series, residues and their applications. 4250—Conformal mapping, Schwarz-Christoffel transformations. Dirichlet problem, applications (steady temperatures, electrostatics, fluid flow), additional topics in complex function theory. Must be taken in sequence. Prereq: 2860; one 4000-level mathematics course recommended.

4510-20-30 Introduction to Analysis (3, 3, 3) Real number system, functions, sequences, limits, continuity, uniform continuity, integration. Functions of several variables, implicit function theorems, variable step and order; stiff systems. Boundary value problems. Prereq: 3150 or 3155 and 4620. (Same as Computer Science 4235.) W, Sp

4540 Infinite Series and Functions of Several Variables (3) Series and sequences of functions, uniform convergence, Taylor's formula, uniform convergence. Partial differentiation and maxima and minima for functions of several variables. LaGrange multipliers. Prereq: 2860.

4650-60-70 Introduction to Mathematical Statistics (3, 3, 3) Introduction to probability; discrete and continuous distributions; regression, correlation, statistical independence; foundations of sampling theory; estimation and hypothesis testing. Must be taken in sequence. Prereq: 2860. F, W, Sp

4710 Vector Analysis (3) Fundamental operations, basis vectors, dot and cross products, directional derivatives, divergence and curl of vector fields, line and surface integrals, Green's, Divergence, and Stokes' theorems. Does not satisfy requirements of major or minor in mathematics. Prereq: 2860. E

4750-60-70 Introductory Probability Theory (3, 3, 3) Elementary combinatorial analysis, probabilities in discrete sample spaces, conditional probability and stochastic independence, binomial, Poisson, hypergeometric and normal distributions. 4760—Expectation, conditional expectation and characteristic function of random variables, infinite sequences of random variables, the weak and strong laws of large numbers, and the central limit theorem. 4770—Markov chains; limiting probabilities; steady-state and stationary distributions; Stochastic processes: Poisson, birth and death processes; Kolmogorov equations. Prereq: 2840-50-60. F, W, Sp

4810 Elementary Number Theory (3) Divisibility, congruences, residues and primitive roots; indices, quadratic reciprocity. Prereq: 2860 or consent of instructor. Su

4980 Readings in Mathematics (1-3) Open to students with consent of department. May be repeated. Maximum 9 hrs.

4990 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Permission of department. May be repeated with consent of department. Maximum 9 hrs.

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

5011 Elementary Functions from an Advanced Standpoint for Teachers (3-4) Order and completeness axioms of real numbers; limits of sequences, derivatives of functions, series of exponential, logarithmic and trigonometric functions; infinite series; convergence; Taylor's and Mac lanedo series; applications of exponential, logarithmic and trigonometric tables. Prereq: 3510 or 3110 or consent of instructor.

5012 Differential Geometry for Teachers (3-4) Advanced techniques applied to graphing functions. Curves, surfaces, path integralization, singular points, tangent lines and tangent planes, osculating planes, arc length of curves in plane and curves on surface, curvature, torsion, asymptotes, ruled surfaces, Fredholm formulas. Prereq: 1 yr of calculus, or consent of instructor.

5013 Geometry for Teachers (3-4) Primarily for high school teachers of geometry. Historical and modern presentations of topics encountered in a high school geometry class: axioms, synthetic and metric treatments; betweenness of segments and triangles; parallel postulate; similarity; area; ruler and compass constructions; Klein's Erlangen Program. Prereq: 2840-50-60. F, W

5014 Analysis for Teachers (3-4) Functions of several variables, vectors, limits and continuity, partial derivatives, directional derivatives and gradient fields, implicit function theorem, maxima and minima, transforms. Prereq: 3510 or consent of instructor.

5015 Probability and Statistical Inference for Teachers (3-4) This course is intended for students in the Master of Mathematics program and for students in graduate programs in education. It may not be applied as graduate credit toward the M.A. or M.S. degree in Mathematics.
Teachers (3-4) Probability distributions including binomial, hypergeometric, and Poisson; moment generating function of continuous random variables; moment generating functions of uniform and normal distributions. Sampling including Chi-square, F, and t distributions; interval estimation of means and variances; simple hypothesis testing. Prereq: 1 yr of calculus and 3050 or consent of instructor.

5050-60-70 Mathematical Logic (3, 3, 3) Truth functions; syntax and semantics of some propositional theory; Gentzen's sequence-calculus and systems of natural deduction; algebraic logic; syntax and semantics of first order theories; elementary model and recursion theory; consistency, completeness, decidability.

5051 Introductory Business Mathematics (3) Graphing of simple equations, straight lines, circles, parabola, functions, algebra of functions, limits, continuity, derivatives of algebraic functions, applications to maxima and minima, convexity and concavity, implicit differentiation, chain rule, higher derivatives, and applications. Credit available only to satisfy MBA core requirement. Prereq: Math 1550 or equivalent.

5052 Mathematics for Business Decisions (3) Exponential function, applications to growth and decay models, antiderivatives, integration as area, fundamental theorem of calculus, method of substitution, integral tables, integration by parts, Simpson's rule and numerical approximations. Functions of two variables, partial derivatives, integration over simple regions, applications, introductory matrix algebra, application to solution of simultaneous equations. Credit available only to satisfy MBA core requirement. Prereq: Math 5051 or equivalent.

5110-20-30 Theory of Functions of a Complex Variable (3, 3, 3) Complex numbers; infinite series; analytic functions; conformal mapping, analytic continuation; special functions; Riemann surfaces. Prereq: 4510-20 for 5110; 4530 for 5120. Must be taken in sequence. F, W, Sp


5310-30-30 Introduction to Higher Geometry (3, 3, 3) Projective spaces; coordinates and transformations, conics and quadrics. Elliptic and hyperbolic geometry from viewpoint of projective geometry. Prereq: 4150-60. Must be taken in sequence.

5370-80-90 Mathematical Principles of Fluid Mechanics (3, 3, 3) Equations of motion, incompressible flows, flow of compressible perfect gas, shock waves in perfect fluids, viscous flows and boundary layer phenomena, additional special topics. Prereq: 4530 or 4710 or consent of instructor. A

5430 Integral Equations (3) Solution of integral equations by methods of Fredholm, Volterra, and Hilbert. Prereq: 4530.


5450-80-70 Introduction to Partial Differential Equations (3, 3, 3) Linear second-order equations in two variables; properties of elliptic, hyperbolic and parabolic equations, separation of variables, and Fourier series; nonhomogeneous problems, problems in higher dimensions, multiple Fourier series, Fourier and Laplace transforms. Prereq: 4510-20 and 4610. Must be taken in sequence. F, W, Sp

5455 Finite Difference Methods for Partial Differential Equations (3) Finite difference techniques for solution of parabolic, elliptic, and hyperbolic equations; consistency, consistency and convergence; nonlinear problems; curved boundaries; solution of linear systems. Prereq: 3150 or 3155, and advanced mathematics course. (Same as Computer Science 5456.) F

5465 Finite Element Methods (3) Finite element techniques for solution of ordinary and partial differential equations. Variational principles, local bases, rates of convergence, and computer implementation. Prereq: 3150 or 3155, and 4225 or consent of instructor. (Same as Computer Science 5465.) F

5475 Advanced Topics in Numerical Partial Differential Equations (3) Finite element methods for eigenvalue problems, IV problems, BV problems with singularities. Other topics, such as special methods, further study of finite difference methods, etc. at discretion of instructor. Prereq: 5455-45. (Same as Computer Science 5475.) Sp

5480-90 Mathematical Programming (3, 3) Optimization methods for constrained optimization problems. Prereq: 3150, 4060 and 4530. W, Sp

5510-20-30 Introduction to Higher Algebra (3, 3, 3) Algebraic systems: groups, rings, integral domains; groups of automorphisms, fundamental theorem, Hahn-Banach theorem, domain of integers, domains of rational numbers. Prereq: 3150, 3155, and abstract mathematics course. (Same as Computer Science 5456.) F

5520 Algebraic Systems (3, 3, 3) Algebraic systems: groups, rings, integral domains; groups of automorphisms, fundamental theorem, Hahn-Banach theorem, domain of integers, domains of rational numbers. Prereq: 3150, 3155, and abstract mathematics course. (Same as Computer Science 5456.) F

5540 Numerical Methods in Physics (3) (Same as Physics 5640.)


5710-20-30 Tensor Analysis (3, 3, 3) Absolute differential calculus in three-dimensional Euclidean space; differential geometry of curves and surfaces; applications to physics; extension to n-dimensional space. Prereq: Major in mathematics or physics. Must be taken in sequence.


5775 Combinatorial Algorithms (3) (Same as Computer Science 5775.)

5810-20-30 Number Theory (3, 3, 3) Arithmetic functions, distribution of primes, Diophantine equations, approximation theory, Shnirelman density and Mann's theorem, quadratic forms, Dirichlet's theorem, prime numbers in arithmetic progression. Prereq or coreq: 5510 for 5810; 5520 for 5820.

5840-50-60 Mathematical Ecology (3, 3, 3) Discrete and continuous models in ecology. Population, community, and ecosystem models. Mathematical modeling perspective. Physical environmental modeling effects in ecosystems. Specific ecosystem models; predator-prey, competition, parasit-host, food chains, and food webs. Stochastic growth models, random model effects. Comparison of stochastic with deterministic models. Prereq for 5840-50: 4610, 4050 or consent of instructor; prereq for 5860: 4750 or 4650 or consent of instructor.

5870-80-90 Introduction to Ordinary Differential Equations (3, 3, 3) Excellence in mathematics, computer science, engineering, electrical functionality, continuity of solutions, linear equations, power series. Frobenius methods for regular singular equations; Poincare-Bendixon theory, stability of critical points; boundary value problems for linear systems; regular and singular perturbation theory for nonlinear systems. Prereq: 4610, 4050, 4610-20-30. F, W, Sp, A

5910-20-30 Elementary Topology (3, 3, 3) Topological spaces; metrization, homeomorphic invariants of point sets; structure of Peano continua. Mapping; homotopy. Introduction to combinatiorial topology. F, W, Sp, A

5970-80 Mathematical Systems Theory (3, 3) Analytical approach to discrete and continuous dynamical systems, fundamentals of control theory, linear problems, linear perturbation theory, nonlinear analysis, sensitivity and stability aspects, applications to ecological systems, role of dynamical systems in ecological modeling, optimal control problems. Prereq: 4610, 4650, 4510 or consent of instructor. F, W, A

5990 Graduate Reading in Mathematics (1-3) Open to graduate students with consent of department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

5991 Seminar Analysis (1-3)

5992 Seminar Topology (1-3)

5993 Seminar Algebra (1-3)

5994 Seminar Foundations (1-3)

5995 Seminar Applied Mathematics (1-3) May be taken for S/N or letter grade.

Note: Registration for seminars may be repeated with consent of department.
Microbiology

MAJOR

Microbiology

DEGREES

M.S., Ph.D.

Professors:

A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; R. J. Courterney, Ph.D. Syracuse; T. C. Monie, Ph.D. Maryland; J. D. MacFarlane, Ph.D. Australia; W. S. Riggby, Ph.D. Duke; B. T. Rousse, Ph.D. Guzgh (Canada); J. M. Woodward (Emeritus); D. E. Harris, Ph.D. Indiana.

Associate Professors:

D. A. Brian, Ph.D. D.V.M. Michigan State; G. S. Sayler, Ph.D. Idaho.

Lecturers:


Students planning to major in Microbiology are expected to present, as undergraduate prerequisites, a minimum of one year of biology, one year of mathematics including calculus, two years of chemistry and one year of physics.

The student's dissertation committee determines whether a foreign language is required for the doctoral degree.

3610 Food Bacteriology (3) Standard methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Coreq: 2910 or 3700 and Chemistry 2230 or 3211. Sp

3819 Food Bacteriology Laboratory (2) Laboratory methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Prereq: 2919 or 3519. Coreq: 3810. Sp

2830 Yeast and Molds (3) Morphology, taxonomy, and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: 2910 or 3700, or consent of instructor. W

3829 Yeasts and Molds Laboratory (2) Methods for examination and cultivation of yeasts and molds. Prereq: 2919 or 3519. Coreq: 3820. W

4110 Physiology of Bacteria (3) Modern concepts of bacterial physiology and metabolism including cell structures and function. Prereq: 3700 and 12 hrs of organic chemistry. Coreq: 3120. F

4119 Bacterial Physiology Laboratory (2) Prereq: 3519. Coreq: 4110. W

4130 Taxonomy of Bacteria (3) Bacterial classification. Prereq: 3700 and 3519. F

4140 Molecular Genetics (3) Transmission and expression of genetic information at the molecular level. Emphasis is on bacterial and viral systems, but unique features of eukaryotic genetic systems are included. Prereq: 3700 or consent of instructor. Sp

4194 Techniques in Microbial Genetics (2) Practical experience in basic techniques in experimentation in microbial genetics. Coreq: 4140. Sp

4150 Microbial Ecology (3) Application of ecological principles to study of microbial communities. Emphasis on fundamental role of microorganisms in natural environments. Prereq: 3700, 1 yr of organic chemistry, Biology 3130, or consent of instructor. Sp

4159 Experimental Microbial Ecology (3) Survey of techniques for assessment of microbial forms, functions, activities, and interactions in a variety of habitats. Prereq: 3519. Coreq: 4150 or consent of instructor. 1 hr and 2 labs. Sp

4270 Immunology (3) Principles of inflammation and immunity, immunoglobulin structure and theories of formation, complement, hypersensitivities, cell cooperation in immune mechanisms, antibodies and the immune system. Prereq: Biology 3130. (Same as Zoology 4270.) F

4279 Advanced Immunology Laboratory (2) Laboratory exercises designed to accompany 4270. Prereq or coreq: 4270. F

4320 Pathogenic Bacteriology (3) Disease producing microorganisms of human and veterinary importance, bacteria, rickettsia, and chlamydia. Prereq: 3200. W

4329 Pathogenic Bacteriology Laboratory (2) Techniques for isolation, cultivation, and identification of pathogenic bacteria. Prereq: 3200. Coreq: 4329. W

4360 Medical Mycology (3) Disease-causing fungi; cytology, physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq: 3700. Sp

4339 Medical Mycology Laboratory (2) Prereq: 3519. Coreq: 4339. Sp

4400 Molecular Virology (3) Molecular aspects of the replication, assembly and expression of viruses, with emphasis on bacteriophage. Prereq: 3700. F

4430 Medical Virology (3) General virology with emphasis on medical aspects. Prereq: 3500. W

4439 Medical Virology Laboratory (2) Laboratory procedures for replication, handling and culturing of animal viruses. Prereq: 3519. Coreq: 4430. W

5000 Thesis (1-15) E

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

5011-12-13-14-15-16 Mini-course in Microbiology (1, 1, 1, 1, 1, 1) Selected, advanced topics in microbiology, concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: as posted. May be repeated. Maximum 9 hrs. S/N/NC only.

5130 Topics in Taxonomy (3) Isolation, cultivation and taxonomic relationships of schizomycetes, emphasis upon less frequently encountered orders. Prereq: 4130. 3 labs.

5310 Selected Topics in Microbiological Research (2) Literature surveys and laboratory methods for development and interpretation of microbiological research. May be repeated.

5350 Advanced Microbiology for Secondary Education (4) Microbiological education for teachers; population studies encountered in natural habitats; laboratory methods for isolation and characterization of naturally occurring microorganisms. Consent of instructor and introductory course in microbiology and general chemistry. Not for degree credit in microbiology. Su

5360 Topics in Immunology and Immunohemistry (4) Molecular and genetic aspects of immunoglobulin synthesis. Theoretical and practical exercise in immunohemistry. Prereq: 4270, Biochemistry 4110-20 or equivalent.

5441-42-43-44-45-46 Clinical Microbiology (6, 6, 6, 6, 6, 6) Six quarters, 6 quarter hrs each consisting of lectures and clinical laboratory experience. Enrollment by consent of department head.

5510-20-30 Research Problems (2, 3, 3)

5720 Microbial Physiology (3) Lectures and seminars dealing with current advances in bacterial physiological including growth and cell structure. Prereq: 4110; Biochemistry 4110-20.

5730 Pathogenesis of Infectious Disease (3) Host response to infection. Derangement of host-microbe interaction by microbial invasion, endotoxins, antibodies and other factors related to virulence. Alteration of genetic and hormonal controls resulting from progressive infection. Prereq: 4320.
Music

**MAJOR Music**

**DEGREES**

M.M., M.A.

**Professors:**


**Associate Professors:**


**Instructors:**


The Department of Music offers the degrees of Master of Music, with concentrations in performance, composition, theory, choral conducting, instrumental conducting, Suzuki string techniques, and piano pedagogy and literature, and the Master of Arts with a major in Music with concentrations in theory and musicology.

Applicants for these degree programs must have completed an undergraduate degree approximately equivalent in music requirements to those required for degrees conferred by The University of Tennessee, Knoxville, appropriate to the prospective area of concentration on the Master's level.

Applicants who plan to pursue the degree in performance shall have as an audition, performance in their area of concentration. Applicants for admission to the program in composition shall submit scores and tape recordings of representative works. All applicants are required to take the Diagnostic Examinations in music theory and music history and literature.

General requirements for the Master's degree begin on page 125 of this catalog.

**THE MASTER OF MUSIC PROGRAM**

**Voice:** 45 hours distributed as follows: (a) 12 hours in applied music, (b) 9 hours in music history/literature or music theory, (c) 6 hours in vocal pedagogy, and (d) 3 hours in recital or lecture-recital. (e) 3 hours in ensemble, and (f) 12 hours in elective (excluding applied music and ensemble).

**Piano:** 45 hours distributed as follows: (a) 12 hours in applied music, (b) 9 hours in piano literature and/or pedagogy, (c) 6 hours in music research, (d) 6 hours in music theory, (e) 3 hours in ensemble or accompanying, (f) 6 hours in music history/literature, (g) 3 hours in recital, and (h) 3 hours in music electives.

**Piano Pedagogy and Literature:** 45 hours distributed as follows: (a) 12 hours in applied music, (b) 12 hours in piano literature and/or pedagogy, (c) 3 hours in music research, (d) 6 hours in music theory, (e) 3 hours in ensemble or accompanying, (f) 6 hours in music history/literature, and (g) 3 hours in recital.

**Organ:** 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in organ literature and/or pedagogy, (c) 3 hours in music research, (d) 9 hours in music theory, (e) 3 hours in recital, (f) 6 hours in music history/literature, and (g) 6 hours in music electives.

**Strings:** 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in area literature and/or pedagogy, (c) 3 hours in research techniques, (d) 6 hours in ensemble, (e) 3 hours in theory, (f) 3 hours in recital, and (g) 6 hours in music electives.

**Wind and Percussion Instruments:** 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in area literature, (c) 3 hours in music research, (d) 3 hours in advanced conducting, (e) 3 hours in music theory, (f) 3-6 hours in ensemble, (g) 3 hours in recital, and (h) 9-12 hours in music electives.

**Composition:** 45 hours distributed as follows: (a) 9 hours in applied composition, (b) 3 hours in music research, (c) 15 hours in music theory, (d) 6 hours in music history/literature, (e) 9 hours in thesis, and (f) 6 hours in electives.

**Music Theory:** 45 hours distributed as follows: (a) 18 hours in music theory, (b) 3 hours in music research, (c) 6 hours in music history/literature, (d) 9 hours in thesis, and (e) 9 hours in electives.

**Choral Conducting:** 45 hours distributed as follows: (a) 6 hours in conducting, (b) 6 hours in choral literature/techniques, (c) 3 hours in music research, (d) 9 hours in theory, (e) 6 hours in ensemble, (f) 3 hours in choral conducting performance or document, and (g) 12 hours in electives.

**Instrumental Conducting:** 45 hours distributed as follows: (a) 8 hours in conducting, (b) 3 hours in area literature, (c) 3 hours in music research, (d) 6 hours in music history/literature, (e) 6 hours in music theory, (f) 3 hours in independent study, (g) 3 hours in band arranging or orchestration, (h) 1 hour in instrumental conducting performance, (i) 3 hours in ensemble, and (j) 9 hours in electives.

**Suzuki String Techniques:** 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in Suzuki literature/techniques, (c) 3 hours in music research, (d) 3 hours in music theory, (e) 3 hours in recital, (f) 6 hours in ensemble, and (g) 12 hours in electives.

**THE MASTER OF ARTS PROGRAM**

**Music Theory:** 45 hours distributed as follows: (a) 18 hours in music theory, (b) 3 hours in music research, (c) 9 hours in music history/literature, (d) 9 hours in thesis, and (e) 6 hours in electives.

**Musicology:** 45 hours distributed as follows: (a) 21 hours in music history/literature, (b) 3 hours in music research, (c) 6 hours in theory, (d) 9 hours in thesis, and (e) 6 hours in electives.

Reading knowledge of French or German must be demonstrated by candidates for the Master of Arts degree.

Specific course requirements will be prescribed by the department for all degree programs and elective courses must have the approval of the student's advisor.

**College of Liberal Arts**

3041 Keyboard Harmony (2) Melody harmonization, figured bass realization, and improvisation. Pre-req: 1131-33, and keyboard proficiency at the 2000 level.

3122 Orchestration (3) Advanced techniques in-in
strumental writing with emphasis on scoring for the concert orchestra. Prereq: 3112 or consent of instructor.

3230 The Concerto (3) Survey of literature from seventeenth century to present.

3240 The Symphony (3) Survey of symphonic literature from precursors of classical symphony to present.

3260 Chamber Music (3) Survey of chamber music from 1750 to present.

3271-81 History of Opera (3, 3) Dramatic, vocal and orchestral elements in opera of Italian, French, and German School. 3271—1600-1800; 3281—1800 to present.

3340 Oratorio (3) Choral works other than those appropriate for use in church.

*3500 Flute (1-4)

*3505 Oboe (1-4)

*3510 Bassoon (1-4)

*3515 Clarinet (1-4)

*3520 Saxophone (1-4)

*3525 Horn (1-4)

*3530 Trumpet (1-4)

*3535 Trombone (1-4)

3540 Baritone (1-4)

*3545 Tuba (1-4)

*3550 Percussion (1-4)

*3555 Voice (1-4)

*3560 Violin (1-4)

*3565 Viola (1-4)

*3570 Cello (1-4)

*3575 String Bass (1-4)

3580 Piano (1-4)

*3585 Harpsichord (1-4)

3590 Organ (1-4)

*3595 Guitar (1-4)

*3597 Composition with Electronic Media (1-3)
Prereq: Consent of instructor.

*3599 Composition (1-3)
Prereq: Consent of instructor.

3590 Evolution of Jazz (3) Study of origin, development and styles of jazz music and its exponents.

4003-04-05 The Organ and Its Literature (3, 3, 3) Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: 3110-20-30. May be repeated.

4007-17-27 String Techniques (1, 1, 1) Problems of string playing; development of string techniques, styles and interpretation, program building. Prereq: Consent of instructor.

4035-37-38 Advanced Piano Literature (2, 2, 2)
Piano music for pre-classic period to present. Prereq: Consent of instructor.

4041 Styles in Opera Acting (3) Study and practice of styles in opera acting based on historical and national characteristics. Prereq: 3015 or consent of instructor.

4045 Projects in Opera Theatre (1-3) Prereq: Consent of instructor. May be repeated.

4050 Advanced Instrumental Conducting (3) Development of knowledge and skills in instrumental conducting; study of various periods and composers and relationship of different styles to the conductor's art; musical analysis and practice in conducting. Prereq: Music Education 4430 or equivalent.

4055-56-57 Elementary and Intermediate Piano Pedagogy (2, 2, 2) Piano methods and materials designed for teaching pre-college level students. Prereq: Consent of instructor.

4060 Choral Techniques I (3) Techniques and methods in producing total choral program.

4074-84 Church Music Seminar (3, 3) History and philosophy of church music, liturgies and liturgical music; church music administration. Prereq: Consent of instructor.

4085 Harpsichord Techniques (1) Techniques of keyboard literature, performance practice, continuo playing, and basic tuning and maintenance. Requires a thorough keyboard background. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated.

4111-21-31-41 Analysis of Music Literature (3, 3, 3) Detailed examination of musical compositions by historical period with emphasis on harmony, thematic material, form and structure. Traditional and contemporary analytical techniques. 4111—1600-1750; 4121—1750-1825; 4131—1825-1900; 4141—1900 to present. Prereq: 3120.

4112 Twentieth-Century Compositional Techniques (3) Styles and compositional devices from Debussy to present. Analysis of scores; idiomatic writing. Prereq: 2131 or equivalent.

4113 Pedagogy of Music Theory (3) Techniques, methods and materials involved in college-level theory programs. Prereq: Consent of instructor.

4114 Stage Band Arranging (3) Analysis of scores and scoring for the stage band. Prereq: 3112 and consent of instructor.

4115 Variation (3) Study and application of variation procedures. Prereq: 3123 or equivalent.

4116 Set Structure in Musical Composition (3) Theory of sets and its application to analysis of music. Prereq: Consent of instructor.

4117 Choral Arranging (3) Analysis of scores and writing of arrangements for men's, women's and mixed choruses. Prereq: 3112 or consent of instructor.

4124 Marching Band Arranging (3) Study and application of techniques employed in scoring for marching band. Prereq: 3112 or equivalent.

4134 Concert Band Arranging (3) Study and application of techniques employed in scoring for concert band. Prereq: 3112 or equivalent.

4140 Music in the Romantic Period (3) Survey of music from Beethoven through post-Romantic instrumental and vocal styles.

4230 Contemporary Music: 1945 to Present (3) Survey of new and avant-garde music in Europe and America since World War II.

4241 American Music (3) American music from colonial times to present. Emphasis on twentieth century. Includes both folk and cultivated traditions. Prereq: 1210-20 or equivalent.

4261-71 Introduction to Ethnomusicology (3, 3) Basic attitudes and techniques of ethnomusicology. Survey of music cultures throughout world. 4261—Pacific, Near East and Asia; 4271—Africa, Europe and Americas.


4290 Gregorian Chant (3) Chants of Latin rite. Mas- ses and Offices examined as functional music as well as by type.

4310 History of Art Song (3) Survey of art song from fifteenth century to 1930.

4315 Wind Chamber Music (3) Study of wind chamber music from eighteenth through twentieth century. Emphasis placed on style interpretation, rehearsal techniques, programming and musical significance, both historical and theoretical.

4340-50 Works of Bach (3, 3) Detailed examination of sonatas, chamber, keyboard, and orchestral works; cantatas, motets, passions and oratorios.

4400 Jazz Directing (1) Rehearsal techniques for jazz ensembles: special conducting techniques, repertoire, library systems, programming, and supervised laboratory experience in rehearsing university jazz ensembles. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

*4500 Flute (1-4)

*4505 Oboe (1-4)

*4510 Bassoon (1-4)

*4515 Clarinet (1-4)

*4520 Saxophone (1-4)

*4525 Horn (1-4)

*4530 Trumpet (1-4)

*4535 Trombone (1-4)

*4540 Baritone (1-4)

*4545 Tuba (1-4)

*4550 Percussion (1-4)

*4555 Voice (1-4)

*4560 Violin (1-4)

*4565 Viola (1-4)

*4570 Cello (1-4)

*4575 String Bass (1-4)

*4580 Piano (1-4)

*4585 Harpsicord (1-4)

*4590 Organ (1-4)

*4595 Guitar (1-4)

*4595 Composition with Electronic Media (1-3)
Prereq: Consent of instructor.

*4599 Composition (1-3)
Prereq: Consent of instructor.

4840 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz and administering of jazz program. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4850 Jazz Composition (3) Prereq: Music 4114 and consent of instructor.

4860 Advanced Improvisation (2) Emphasis on further development of individual skills and solving individual problems in jazz improvisation. Prereq: 3082-93.

5000 Thesis (1-15) E

5001 Choral Conducting Project (1-3) Analytical-critical-historical-technical essay on choral music.

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

510 Organ Literature Seminar (3) Topics vary. Prereq: Organ literature.

5122-23 Pedagogy of Voice (2, 2, 2) 5012—Survey of voice production processes in singing including: voice classification, quality, diction registration, breath support, and control. 5022—Examination of teaching materials, preparation of programs for various vocal categories and levels of study. Observation of studio teachings. 5032—Analysis of the vocal
problems of a selected group of students. Supervised teaching. Prereq: 4012-22-32 or consent of instructor.


*5030 Choral Literature Seminar (3) Topics vary.

5033-34-35 Advanced Diction for Singers (2, 2, 2) Practical performance and application of diction theory. Prereq: 2055-65-75 or equivalent.

*5040 Vocal Literature Seminar (3) Topics vary.


5050 Graduate Recital (3)

5051 Opera Performance (3)

5052 Vocal Chamber Music Performance (3)

5054 Lecture-Recital (3)

5055-56 Practicum for Instrumental Conductors (1, 1) Intern experience in choral music and in an instrumental field other than the area of major interest. S/NC only.

5057 Instrumental Conducting Seminar (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 4060 or equivalent.

5060 Seminar in Choral Performance (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to vocal problems. Prereq: 4060 or equivalent.

5061 Choral Conducting (3) Development of choral conducting skills.

*5070 Opera Production (1-3) Prereq: Consent of instructor.

5080 Instrumental Conducting Performances (1) Jury performance; conducting band or orchestra in public.

*5090 Special Topics in Performance (1-3) Prereq: Consent of department head.

*5100 Independent Study in Music Theory (1) Prereq: Consent of department head.

5114 History of Music Theory (3) Work and contributions of theorists from ancient Greece to present. Emphasis on 1600 to present. Prereq: Consent of instructor.

5116 Musical Styles (3) Elements of design and their role in definition of musical styles. Exercises in aural and visual identification. Prereq: Consent of instructor.

5121 Analytical Techniques (2) Analytical techniques with emphasis on contemporary approaches. Tonal and nontonal music. Prereq: Consent of instructor.

*5125 Practicum in Computers and Music Research (3) Programming languages, design and implementation of projects in musical analysis, composition and indexing. Prereq: Consent of instructor.

*5150 Seminar in Music Theory (3) Topics vary. Prereq: Consent of instructor.

*5200 Independent Study in Music History and Literature (1-3) Prereq: Consent of department head.

5210 Introduction to Music Research (3) Principles and techniques of research. Required of all candidates with concentrations in musicology or in music theory; recommended for all music students who intend to enroll in a doctoral program.

5220 Music Bibliography (3) Bibliographic methods. Illustrative projects in information retrieval and problem solving in music.

*5270 Composer Seminar (3) Topics vary. Prereq: Consent of instructor.

5315 Band Literature (3) Band literature and origins of band emphasizing its important, expanded cultivation during past century in United States and Europe.

5350 Music in the Middle Ages (3) Emphasis on early Christian chant, medieval secular song, early theory, and the development of polyphony and musical notation.

5352 Music in the Renaissance (3) From 1400 to 1600. Mass, motet, chansons, madrigal, and other vocal and instrumental forms and genres.

5353 Music in the Baroque Period (3) From 1600 to 1750; rise of opera and oratorio, church and secular cantata, instrumental forms, performance practice.

5355 Music in the Classic Period (3) Preclassical music (Rococo) and music of Haydn, Mozart and early Beethoven. Includes background of other cultural and artistic activities.

5357 Music in the Romantic Period (3) Survey from Beethoven through post-Romantic instrumental and vocal styles.

5359 Music in the Twentieth Century (3) From 1890 (Debussy) to the present (Stockhausen and others).

5400 Musical Aesthetics (3) Nature of music and musical experience, sense perception and emotions, value in music, and role of artist in society. Aesthetic viewpoint of individuals and historical eras through selected writings.

*5500 Flute (1-4)

*5505 Oboe (1-4)

*5510 Bassoon (1-4)

*5515 Clarinet (1-4)

5520 Saxophone (1-4)

5525 Horn (1-4)

5530 Trumpet (1-4)

5535 Trombone (1-4)

5540 Baritone (1-4)

5545 Tuba (1-4)

5550 Percussion (1-4)

5555 Voice (1-4)

5560 Violin (1-4)

5565 Viola (1-4)

5570 Cello (1-4)

5575 String Bass (1-4)

5580 Piano (1-4)

5585 Harpsichord (1-4)

5590 Organ (1-4)

5595 Guitar (1-4)

5597 Composition with Electronic Media (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

*5599 Composition (1-3) Prereq: Consent of instructor.

**5600 Small Ensemble (1)

**5602 Brass Choir (1)

**5604 Jazz Ensemble (1)

**5606 Trombone Choir (1)

**5610 Percussion Ensemble (1)

**5611 Marimba Choir (1)

**5612 Baroque Ensemble (1)

**5620 UT Singers (1)

May be repeated.

*5630 Chamber Singers (1)

**5632 Collegium (1)

**5634 Saxophone Choir (1)

**5640 Opera Theatre (1)

**5642 Opera Workshop (1)

**5650 Concert Band (1)

**5652 Campus Band (1)

**5654 Varsity Band (1)

**5656 Laboratory Band (1)

**5657 Marching Band (1)

**5670 Symphony Orchestra (1)

**5680 Concert Choir (1)

**5682 University Chorus (1)

**5687 Women's Chorale (1)

**5699 Accompanying (1)

May be repeated. Maximum 6 hrs.

Philosophy

MAJOR

DEGREES

Philosophy

M.A., Ph.D.

Professors:
J. F. Davis (Head), Ph.D. Emory; R. E. Aguilla, Ph.D. Northwestern; L. B. Cebik, Ph.D. Nebraska; R. B. Edwards, Ph.D. Emory; M. H. Moore (Emeritus), Ph.D. Chicago, D. Van de Vate, Jr., Ph.D. Yale.

Associate Professors:

Assistant Professors:
H. P. Hamlin, Ph.D. Georgia; R. Jones, Ph.D. Chicago; J. E. Nott, Ph.D. Ohio State; D. E. Osi, Ph.D. Texas (Austin); S. Reaven, Ph.D. California (Berkeley).

THE MASTER'S PROGRAM

See general requirements on page 18. Courses below 4000 may not be taken for graduate credit by philosophy majors except with special permission.

THE DOCTORAL PROGRAM

Specific requirements for doctoral students in Philosophy include a minimum of three academic years of graduate study involving at least 72 quarter hours credit in course work (normally 24 quarter courses or their equivalent, exclusive of credit for the thesis and dissertation) of which not less than 45 shall be in courses numbered over 5000, and of which at least 9 shall be in a subject other than philosophy. The specific number and distribution of courses will be determined by the student's faculty committee.

Two foreign languages, normally French and German, are required. As an alternative to the two-language requirement, candidates for the Ph.D. may elect to demonstrate a substantially more advanced proficiency in reading knowledge of one language. Requirements for this option may be obtained in the department office.

Registration in any course in the 5000 or 6000 series (except 5050 and 5910-20-30) may be repeated for credit with the consent of the department. That is, courses having the same number, but with different subject matter, may be taken with each separate subject description.
MEDICAL ETHICS
The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Details concerning the program can be obtained from the department.

RELIGIOUS STUDIES
The department has an M.A. program of graduate study with a concentration in philosophy of religion and other religious studies. Details concerning the program can be obtained from the Religious Studies Departments.

3111 Ancient Western Philosophy (4) F, W
3121 Medieval Philosophy (4) F, Sp
3131 Seventeenth- and Eighteenth-century Philosophy (4) E
3141 Nineteenth-century Philosophy (4) F, Sp
Religious Studies Departments.

philosophy of religion and other religious
concerning the program can be obtained from
concentration in medical ethics. Details
program of graduate study with a

MEDICAL ETHICS
3270 Russian Philosophical and Theological Thought (4) (Same as Religious Studies 3270 and Russian 32370.)
3311-12 American Philosophy (4, 4) 3311-Colo-
3441 Nineteenth-century Philosophy (4) F, Sp
3511 Contemporary Philosophy (4) Survey of recent movements in philosophy. F
3527 Russian Philosophical and Theological Thought (4) (Same as Religious Studies 35270 and Russian 35270.)
3531-12 American Philosophy (4, 4) 3511—Colo-

3660 Buddhist Philosophy and Religion (4) F, Sp, Su
3650 Philosophy and Religion in India (4) (Same as Religious Studies 3650.)
3671 Religion and Philosophy in China (4) (Same as Religious Studies 3671.)
3690 Philosophy of Religion (4) Analysis of basic issues of religion. (Same as Religious Studies 3690.)
3740-50 Conceptual History of Science (4, 4) 3740—The Scientific Revolution: historical evolution of thought in astronomy, mechanics and philosophy of nature up to Newton. 3750—The development and decline of Newtonian science: historical evolution of thought on the nature of matter and of light, and on that of life. Prereq: 8 hrs of physical science or consent of instructor. F, W
3770 Introduction to Philosophy of Science (4) Standard topics in philosophy of science: scientific method, nature of laws and theories, problems of induction, explanation, measurement. No background in logic presupposed. F
3810 Introductory Symbolic Logic (4) Techniques for formal analysis of deductive reasoning (propositional logic and quantification theory.) Sp
3810 Contemporary Aesthetics (4) Philosophical discussion of contemporary art. F, W, Sp
4000 Special Topics (4) A student- or instructor-initiated course to be offered at convenience of department. Subject matter to be determined by mutual consent of students and instructor with approval of department. Prerequisites to be determined by department. May be repeated.
4111-21 Modern Religious Philosophies (4, 4) (Same as Religious Studies 4111-21.)
4200 Classical Indian Systems of Philosophy: The Moksha Tradition (4) (Same as Religious Studies 4200.)
4310 Intermediate Ethics (4) Topics in metaethics or ethics. Sp
4370 Theoretical Issues in Medical Ethics (4) Prereq: 2310 or 3611 or consent of instructor. (Same as Religious Studies 4370.) Sp
4410 Plato (4) Prereq: 8 hrs philosophy or consent of instructor. A
4420 Aristotle (4) Prereq: 8 hrs philosophy or consent of instructor. A
4450 Continental Rationalism (4) Prereq: 8 hrs philosophy or consent of instructor. A
4460 British Empiricism (4) Prereq: 8 hrs philosophy or consent of instructor. A
4470 Kant (4) Prereq: 8 hrs philosophy or consent of instructor. A
4480 Advanced Topics in Existentialism and Phenomenology (4) Prereq: 8 hrs philosophy or consent of instructor.
4511 Advanced Topics in Logic (4) Prereq: Consent of instructor. May be repeated.
4610 Philosophical Analysis (4) Prereq: 8 hrs philosophy or consent of instructor.
4620 Philosophy of Mind (4) Problems of mind and body in relation to consciousness and personal identity. Prereq: 8 hrs philosophy or consent of instructor.
4630 Philosophy of Language (4) Prereq: 8 hrs philosophy or consent of instructor.
4710 Philosophy of Natural Science (4) Consideration of standard topics pertinent to natural science including reduction of theories and teleological explanation. Familiarity with symbolic logic is recommended. Prereq: 3770 or 2 yrs natural science.
4720 Philosophy of Social Science (4) Examination of methods of inquiry and modes of explanation in social sciences. Prereq: 3770 or 2 yrs social science.
4810 Metaphysics (4) Prereq: 8 hrs philosophy or consent of instructor.
5000 Thesis (1-15) E
5050 Symbolic Logic (4)
5080 Philosophy of Logic (4) Nature of logic: epistemological, metaphysical and axiological assumptions and implications in various theories of logic. Prereq: 4510 or equivalent.
5101 Foreign Study (1-12) See page 97. E
5102 Off-campus Study (1-12) See page 97. E
5103 Independent Study (1-12) See page 97. E
5110-20-30-40-50-60 Studies in the History of European Philosophy (4, 4, 4, 4, 4, 4) Intensive critical work on major philosopher or school. 5110— Greek. 5120—Heidegger or Medieval. 5130—Mod-
Physics and Astronomy

Major Degrees

Physics

Physics

Program: W. M. Bogg (Head), Ph.D., Tennessee; C. L. Bingham, Ph.D., Tennessee; D. R. Birkhoff, Ph.D., Northwestern; M. A. Brecon, Ph.D., Michigan; T. A. Callicott, Ph.D., Purdue; G. L. Christophorou, Ph.D., University of Manchester (England); G. T. Condo, Ph.D., Illinois; W. E. Deeds, Ph.D., Ohio State; J. D. Hicks, Ph.D., Vanderbilt; J. L. Fowler, Ph.D., Princeton; K. Fox, Ph.D., Michigan; N. M. Gullar, Ph.D., Ohio State; E. G. Harris, Ph.D., Tennessee; L. Hart, Ph.D., Cornell; D. T. King, Ph.D., Bristol University (England); R. J. Lovell, Ph.D., Vanderbilt; A. A. Mason, Ph.D., Pennsylvania; H. A. Nelson, (Emeritus), Ph.D., Michigan; F. E. Obershan, Jr., Ph.D., Pennsylvania; R. D. Present, Ph.D., Harvard; R. H. Ritchie, Ph.D., Tennessee; H. C. Schwoener, Ph.D., Massachusetts Institute of Technology; J. M. Smolin, Ph.D., Chicago; P. H. Stevens, Ph.D., Massachusetts Institute of Technology; J. O. Thomson, Ph.D., Illinois; T. A. Welton, Ph.D., Illinois; J. W. White, Ph.D., North Carolina.

Associate Professors: W. C. Ehrass, Ph.D., Brigham State; R. W. Childress, Ph.D., Vanderbilt; J. Cornett, Ph.D., Colorado State; H. W. Crater, Ph.D., Yale; E. K. Buckett, Ph.D., Tennessee; W. A. Dunnill, Ph.D., Florida; S. Georgiou, Ph.D., Manchester (England); R. H. Hitchings, Ph.D., Tennessee; T. A. Habbard, Ph.D., Yale; R. H. Koth, Ph.D., Ohio State; J. W. Lewis, Ph.D., Mississippi; R. W. Lide, Ph.D., Michigan; W. K. McGee, Ph.D., Tennessee; L. R. Painter, Ph.D., Tennessee; J. D. Pegg, Ph.D., New Hampshire; G. K. Reddick, Ph.D., Vanderbilt; S. Y. Shiekh, Ph.D., Maryland; C. C. Shiht, Ph.D., Cornell; J. R. Thompson, Ph.D., Duke.

Assistant Professors: S. B. Elston, Ph.D., Massachusetts; M. F. Fair, M.S., Pennsylvania; M. W. Guildy, Ph.D., Tennessee; T. H. Handler, Ph.D., Rutgers; D. L. McCorkle, Ph.D., Tennessee.

Lecturers: R. L. Becker, Ph.D., Yale.

A student who enters the Graduate School with the intention of attaining an advanced degree in Physics may, in general, complete an undergraduate major in physics or its equivalent. Physics 3210-20-30, 3710-20-30 or 4110-20-30, 4210-20, 4230 or 4240-30 constitutes the minimum course prerequisite to graduate study.

A student who intends to present Physics as a graduate minor shall, in general, have completed an undergraduate minor in Physics or its equivalent. Physics 3210-20, 4210-20 constitute the minimum course work prerequisite to graduate study.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are offered in a number of specialized fields including chemical physics, elementary particle physics, atomic and low temperature physics, health physics, molecular spectroscopy, nuclear physics, plasma physics, solid state physics, theoretical physics, ultrasonics, heavy ion atomic physics, biophysics, and liquid state physics.

Departmental graduate programs providing special opportunities for academic research work in areas of current interest such as atmospheric and space flight are available at the Space Institute, Tullahoma.

All first-year graduate students are required to take a qualifying examination in undergraduate physics during the fall quarter registration period.

The Master's Program

The Physics Department has two Master's degree programs—thesis and non-thesis.

The thesis program is primarily designed for students intending to go into industrial or governmental laboratories as physicists. The course work requirements include 24 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 5110-20-30, 5210-20-30, 5310-20-30, 5610-20-30 and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

The non-thesis program is primarily designed for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking an M.S. in Physics by this method must apply to the department's graduate committee for permission to enroll under this program. The requirements for the M.S. under this method are the satisfactory completion of 45 hours of course work composed of 27 hours from course work numbered 5000 or above (e.g., 5110-20-30, 5210-20-30, 5310-20-30); 9 hours in a minor field (e.g., mathematics); and 9 hours from other courses in physics numbered above 4000 (preferably advanced laboratory nature). In addition, the candidate must pass a comprehensive examination administered by the committee.

The Physics Department is also participating in the program which leads to the Master of Arts in College Teaching degree. In addition to the requirements for either of the Master's programs described above, the MACT degree in Physics requires 15 more hours of course work composed of 9 hours of course work numbered in the 5000 series and 6 hours from courses numbered in the 6000 series. Three hours of these hours are specified as follows: 3 hours in a seminar course dealing with general problems of college teaching; 3 hours in a seminar course dealing with special problems in the teaching of physics; and 3 hours in a course dealing with the history and philosophy of physics. The other 6 hours of course work may be elected from any of the physics courses numbered above 5000. During the two-year program leading to the MACT degree, the candidate will be continually engaged in supervised teaching activities.

The Doctoral Program

All students are expected to take 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 6110-20-30 and 6310. Physics 6210-20-30 are normally required of students specializing in nuclear physics, Physics 6500-10 of students in plasma physics, Physics 6610-20-30 of students in health physics, Physics 6710-20-30 of students in state physics, and Physics 6810-20 of students specializing in molecular spectra. The Master's degree is not required.

A reading knowledge of one foreign language in which there exists a significant body of literature is required.

German or French 3030 with a grade of A or B may be substituted for the corresponding language examination.

The thesis topic will be chosen with reference to one of the fields in which research facilities can be provided by the University laboratory or at the Oak Ridge National Laboratory, Oak Ridge, Tennessee. A program leading to the Ph.D. in chemical physics is conducted jointly with the Chemistry Department, which offers a similar degree. Physics departmental requirements for the degree in chemical physics include the successful completion of: Physics 4510, 4610-20-30, 5210-20-30, 5310-20-30, 5510-20-30, 5610-20-30, 6110-20-30, and either 6310 or 5720; Chemistry 4160-70, 5430, and any two quarters from 5340-50, 6730 or 6810-20.

Astronomy

4110-20-30 Astrophysics

3, 3, 3 Physics of stars and interstellar matter; planets and interplanetary matter; atmospheres, interiors, and evolution; nebulae, quasars, pulsars. Observational data and their determination. Current developments. Approach will be interdisciplinary. Acceptable for major credit in physics. Prereq: Physics 2330 and consent of instructor.

Physics

3210-20-50 Mechanics


3230 Heat and Thermodynamics

3 Concepts of temperature and heat; laws of thermodynamics; applications of laws to simple physical and chemical problems. Prereq: 2320 or 2330 and calculus; 3210- 20 or consent of instructor. Sp, Su

3410-20-30 Concepts of Modern Physics

3 Modern ideas of atomic structure, nuclear changes, particles, and radiation. Not for credit for physics majors or minors. Prereq: General physics. Must be taken in sequence. F, W, Sp

3510-20-30 Physical Measurements

3, 3, 3 Laboratory measurement of some physical quantities. Theory supplied where necessary. Prereq: 2310-20-30 or 2210-20-30, and calculus; 3510 for 3520 and 3530. 3 labs.

3610-20 Electronics

3, 3 Electronic components and circuits of interest to physicists. Prereq: 3210- 20 or 3220-20-30 and calculus. 3 labs. F, W, Su

3630 Nuclear Electronics Laboratory

3 Elementary circuits of interest in nuclear instrumentation are designed and built, and their characteristics are tested as a function of various parameters. Prereq: 3610-20. Sp

3710-20-30 Introduction to Atomic and Nuclear Physics

3, 3, 3 3710—Static and elementary quantum theory. 3720—Atomic and molecular physics. 3730—Nuclear physics. Prereq: Mathematics 2860 and Physics 2320 for 3710; 2338 or 3710 for 3720-30. E

4040 Foundations of Physics

3 Selected topics from history and philosophy of classical and modern physics. Prereq: 1 yr general physics and consent of instructor. Required of MACT candidates. Sp

4110-20-30 Introduction to Quantum Mechanics


4140 Elementary Nuclear Physics

3 General properties of nuclei, two-nucleon systems, nuclear forces, nuclear models, nuclear reactions, nuclear disintegrations and beta-decay, nuclear spin and magnetism. Prereq: 3730 or 4120 Sp
1460 Physical Acoustics (4) Considerations fundamental to detailed investigation of any branch of acoustics; influences of basic waves in the infrasonic, the audible, the ultrasonic, and the hyper-sonic ranges of frequencies. Prereq: 3210-20, 3230. 3 hrs and 1 lab. W, F, Sp

4210-20-50 Electricity and Magnetism (3, 3, 3) Intermediate level electrodynamics; steady and alternating currents; laws of electromagnetism; Maxwell’s equations; radiation of electromagnetic waves; reflection and refraction; electromagnetic fields of moving charges. Must be taken in sequence. Prereq: 2230 or 2222 and Mathematics 2830. F, W, Sp.

4230-40 Modern Optics (4, 4) Geometrical Optics: Reflection and transmission of light at a dielectric interface, paraxial theory of interfaces, lenses, and mirrors; thick lenses, lens systems, ray tracing; polarization; imaging; laser light. 4240—Physical Optics; Mathematics of wave motion, superposition of waves; interference; Fraunhofer and Fresnel diffraction; Fourier optics; holography. Prereq or coreq: 4210 or consent of instructor. 3 hrs and 3 hrs lab. W, F


4540-50 Experimental Nuclear and Radiation Physics (4, 4) Interaction of charged particles and electromagnetic radiation with matter; quantum mechanical theory of characteristics of various detectors; statistics of counting, nuclear properties. Experiments illustrate reactions of protons, neutrons, and photons in the nucleus and nuclear radiation. Prereq: 2330, 1 hr and 6 hrs lab. F, Su

4580 Principles of Nondestructive Testing (3) Detection and characterization of discontinuities in materials by nondestructive physical measurements. Ultrasonic, electromagnetic, holographic and pene-trating radiation techniques are discussed. Prereq: 3210-20 by consent of instructor. (Same as Engineering Science 4580). W


5000 Thesis (1-15) E

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

5080 Graduate Research Participation (3) Advanced research techniques under supervision of staff. This research area consists of a variety of specialized fields with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. N/C only. E

5110-20-30 Introduction to Theoretical Physics (3, 3, 3) Classical theoretical physics, with limited use of special relativity. 4210—Advanced calculus, differential equations, and vector analysis. F, W, Sp

5210-20 Advanced Modern Physics (3, 3, 3) Basic principles of wave mechanics; one-electron atom; atomic and molecular spectroscopic-copy; molecular binding; relativity; properties of nuclei (spin, magnetic moments, scattering phenomena); nuclear models and forces; high-energy physics. Prereq: 5210-20, 5210-30, 4210-20, differential equations. Must be taken in sequence. F, W, Sp.


5640 Numerical Methods in Physics (3) Numerical methods available for solution of physical problems, Pointed towards the use of digital computing machinery; analysis of errors. Prereq: 5610-20-30, or consent of instructor. (Same as Mathematics 5640). F

5720 Physics of Polymetonic Molecules (3) Introduction to electronic structure of molecules and physical processes of luminescence of these molecules, theoretical and experimental aspects of inter-molecular and intramolecular electron excitation energy transfer and charge transfer; application of excitation energy transfer and charge transfer to such field as organic molecular reactivity and organic scintillation. Prereq: 5210-20 or consent of instructor. Sp

5910-20-30 Special Problems (3, 3, 3) Specially assigned theoretical or experimental work on problems not covered in course. F

5911-31 Special Problems in the Teaching of Physics (1, 1) Design of physics experiments and demonstrations; construction and analysis of physical tests and examinations, techniques in presentation of physics topics, and related problems. Prereq: Consent of instructor. Required of MACT candidates.


6000 Doctoral Research and Dissertation (3) E

6110-20-30 Quantum Mechanics (3, 3, 3) Fundamental principles of quantum mechanics and principalapproximation methods. Applications to atomic, molecular, and nuclear physics. Prereq: 4210 or 5210; 5310-20-30 or 5410-20-30. Whatever of latter series not used as prerequisite is considered corequisite. F, W, Sp.


6310 Electromagnetic Theory of Light (3) Classical electric and magnetic fields and waves; dispersion and absorption; scattering of light and x-rays; dielectric and magnetic properties of gases and solids. Optical properties of electromagnetic waves in isotropic media including reflection, refraction and polarization and also theory of diffraction. Prereq: 5410-20-30. Su.

6320 Special Relativity (3) Lorentz transformation; Einstein postulates; relativistic tensors; relativistic mechanics; relativistic electrodynamics. Prereq: 5310-20-30, 5410-20-30, 5310. F.

6330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prereq: 5320. W.

6420 Advanced Topics in Classical Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta decay, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, theory of fields. Prereq: 5110-20-30. May be repeated with consent of department.

6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) Electrical conduction in gases at high and low pressures. Characteristics of spark, arc and glow discharge. Collective phenomena in a plasma; plasma oscillation; magnetohydrodynamics; instabilities. Topics of current interest in astrophysics, geophysics and thermonuclear research. Prereq: 3710-20-30 and either 5410-20-30 or Electric Engineering 6500-10. F, W.

6610 Interaction of Radiation with Gases (3) Interaction of electromagnetic radiation with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules; ionization, transcription and light emission. Electron interaction, transport and capture; electron swarm and electron beam experiments. Prereq or coreq: 6110-20-30. E

6620 Interaction of Electrons with Solids (3) Collisions with free electrons; stopping power; electron slowing down spectra, energy straggling; nuclear scattering; electron diffusion; plasmon effects in irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: 6110-20-30. E


6710-20 Advanced Solid State Physics (3, 3, 3) Lattice dynamics; phonons; Brillouin zones; heat capacity. Energy band structure of solids; cohesive energy, work functions. Introduction to solid state physics: effective mass approximation. Dia-, para-, and ferromagnetism; neutron diffraction. Fermi surface, Pauli exclusion principle, Properties of metals from phonons, electrons, and defects. Excitations;
polars; surface states. F-centers; dislocations; and other defects. Prereq: 4530, 5210-20. Prereq or coreq: 4530, 5110 for 6710, 6120 for 6720.

6810 Vibrational Problems in Molecular Spectra
(3) Normal coordinates and potential functions; group theoretical methods and selection rules in gases and condensed phases. Lasersam spectroscopy and nonlinear electro-optical phenomena. Pre-req: 5420 or equivalent. (Same as Chemistry 6810).

6820 Molecular Vibration-Rotation Theory
(3) Molecules as vibrating and rotating systems possessing specific symmetry properties: quantum mechanical theory of symmetric and asymmetric molecular vibrators including vibration-rotation interaction theory; intensities and energies of molecular transitions; methods of analysis used in high resolution molecular spectroscopy. (Same as Chemistry 6820.)

Political Science

MAJORS

Political Science
M.A., Ph.D.

Public Administration
M.P.A.

DEGREES

Political Science
M.A., Ph.D., M.P.A.

Public Administration
M.P.A.

Professors:
T. D. Unger (Head), Ph.D. Iowa; R. S. Avery (Emeritus), Ph.D. Northwestern; D. H. Carlisle, Ph.D. North Carolina; L. S. Greene* (Emeritus), Ph.D. Wisconsin; W. R. Iredel, Ph.D. Chicago; D. D. Nimmo, Ph.D. Vanderbilt; H. Fiesa, Ph.D.; Utah; N. M. Robinson, Ph.D. Syracuse; C. H. Stephens, Ph.D. Johns Hopkins; D. L. Welborn, Ph.D. Texas.

Associate Professors:
R. B. Cunningham, Ph.D. Indiana; J. Dodd, Ph.D. Tulane; G. Erland, Ph.D. Columbia; A. H. Hopkins, Ph.D. Syracuse; W. Lyons, Ph.D. Oklahoma; R. L. Peterson, Ph.D. Yale; T. McN. Simpson, Ph.D. Johns Hopkins; T. A. Smith, Ph.D. Dho State.

Assistant Professors:

Registration in any courses in the 5000-6000 series may be repeated for credit with consent of the department.

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of promoting sound governmental administration through research, publication, and consultation. The staff is as follows: Professors: Unger (director), Professor Fitzgerald (associate director), and Professors Freeman and Olishski (assistant professors).

THE MASTER'S PROGRAM

See general requirements on page 18.

MASTER'S IN PUBLIC ADMINISTRATION

Specific requirements for graduation include:
1. The completion of 54 quarter hours of approved graduate courses.
2. At least fifty percent of the credit hours must be in approved courses numbered 5000 and above.
3. Demonstration of command of the material covered in course work through a written comprehensive examination which may be followed by an oral examination.

The 54 quarter hours of graduate courses comprise 30 quarter hours of core courses which focus upon general perspectives, analytical skills, and management skills, a recommended internship arranged with a cooperating public agency (9 quarter hours), and 15 quarter hours in an elective specialized track developed by the student with the approval of the coordinator of the M.P.A. program. The specialized track will often contain a mix of courses from political science and one or more outside fields; examples include general government, public health administration, fiscal administration, social services administration, administration of criminal justice, urban administration, environmental and natural resources administration.

Inquiries concerning all programs should be directed to the Department of Political Science, Knoxville, Tennessee 37916.

THE DOCTORAL PROGRAM

Specific requirements for the degree of Doctor of Philosophy in Political Science include:
1. A minimum of 117 quarter hours following the Bachelor's degree, is required. At least 93 hours shall be in political science.
2. At least 72 hours in political science shall be graduate level hours (i.e. earned in 5000- or 6000-level courses). At least 45 of these graduate level hours shall be at the 6000 level. This figure includes 36 hours of credit for the dissertation.
3. Each Ph.D. candidate must pass an examination in one foreign language.
4. Admission to candidacy shall be based on a written and oral comprehensive examination which must be passed not later than three quarters before the date on which the degree is granted.

5. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.

3545 United States Constitutional Law: Sources of Power and Restraint (4) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political rights. Recommended prereq: 2510-20, F, W


3555 Minority Group Politics in the United States (4) Content varies from quarter to quarter. May be repeated with consent of department. Maximum 8 hrs. W

3555 Introduction to Public Administrative Organization and Management (4) Organization and decision-making theory, line and staff services, politics of organization, leadership, personnel and fiscal management, administrative responsibility. Recommended prereq: 2510-20, F, W, Sp

3566 Public Administration and the Policymaking Process (4) Public bureaucracies and the policy-making process, their political environments, administrative problems associated with policy making. Recommended prereq: 2510-20, F, W, Sp

3605 Political Change in Developing Areas (4) Characteristics and problems of political change with primary focus on developing areas. F, Sp

3615-16 Dynamics of Black African Politics (4, 4) F, W

3621 Contemporary China and Japan (4)

3622 Contemporary South and Southeast Asian States (4) Analysis of selected states, with emphasis on problems of development.

3625-26 Latin American Government and Politics (4, 4) F, W

3630 Government and Politics of the Soviet Union (4, 4) F, W

3635-36 Politics in Western Democracies (4, 4) Political culture, patterns, and institutions of Western democratic systems. F, Sp, A, W

3641 Government and Politics of Middle East and North Africa (4)

3710 State Politics (4) Focus on formal and informal setting of state government; governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. F

3720 State Government and Policy Making (4) Nature and functions of the institutions of state government; governors, courts, legislature, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. W

3750 The Urban Policy (4) Analysis of political institutions and processes in metropolitan areas. W

3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas. Sp

3796 Contemporary Problems of Soviet Foreign Policy (4) Sp

3801 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought. W

3802 Studies in Medieval Political Thought (4) From Augustine to Luther; emphasis on problems and theories of religion and politics. W or Sp

3803 Studies in Early Modern Political Thought (4) Machiavelli through the Enlightenment. W

3804 Studies in Nineteenth- and Twentieth-century Political Thought (4) Political theories of industrial and technological societies; nineteenth and twentieth century. Sp

3880 American Political Thought (4) Examination of role of selected political ideas, doctrines, and theories in America, emphasizing their development and relationships to diverse political interests. F

4060 Revolution (4) Characteristics, theories, and consequences of revolution, with particular focus on left-wing revolutions and movements. Sp

4410 Law and the Administrative Process (4) Principles of, procedures, of controls over administrators. Sp

4535-36 Political Attitudes, Opinions and Communication (4, 4) Nature, development, formation and distribution of politically relevant attitudes and opinions; role of leadership, persuasion, and communication in opinion-policy process. F, W


4545-46 The Judicial Process (4, 4) The study of courts as components of political systems, and public policy formulation through judicial decision making. Recommended prereq: 2510-20. Sp; W

4550 Congress (4) Nature, functions, and processes of U.S. Congress. Sp

4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4610 Budgetary Process (4) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications. W or Sp

4620 Public Personnel Administration (4) Development of the merit system in government, career systems, public personnel management functions, organization for personnel management. F or W
4655-56 Policy Making in Democracies (4, 4)
Comparative approach to theory and process of making public policies. F or Sp; W

4675 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4701-02 International Organization (4, 4) 4701—The League of Nations and the United Nations. 4702—Functional and regional organizations. W or Sp

4711 International Law (4)

4727 Politics of Inter-American Relations (4) Analysis of selected theoretical and policy issues concerning international relations in the Americas with emphasis upon imperialism, intervention, and the Cuban Revolution, nationalism, foreign assistance, trade and economic integration. Sp, A

4740 Political Parties and Elections (4) Analysis of party systems and electoral process. F, W

4750 Political Campaigns (4) All aspects of campaign process. F, W

4815 Contemporary Soviet Marxism-Leninism (4) Soviet applications of Marx-Leninist theory.

4875 Special Topics in Political Thought (4) May be repeated with consent of department. Maximum 8 hrs.

4940 Politics and the Environment (4) Examination of formulation and implementation of public policies relating to physical environment with emphasis upon water and air pollution control. Sp

4975 Proseminar in Political Science (4) Selected research for seniors; primarily for majors. May be repeated with consent of department. Maximum 8 hrs.

5000 Thesis (1-15) E

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

5101 Foreign Study (1-12) See page 97. E

5102 Off-campus Study (1-12) See page 97. E

5103 Independent Study (1-12) See page 97 E

5110-20 Seminar in Political Theory (3, 3) Selected political thinkers, schools, historical periods. F, W, Sp

5140 Politics, Administration and Community in Nonmetropolitan Areas (3) Analysis of problems and processes associated with community development. Sp

5150 Internship in Political Science (3-9) Open to students participating in approved internship programs. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only. E

5210-20-30 Seminar in World Politics (3, 3, 3) Research in world politics and organization. F; W; Sp

5211 Directed Readings in Political Science (3) May be repeated with consent of instructor and student's advisor. Maximum 8 hrs. May be taken for S/NC. E

5250 Seminar in African Politics (3) Selected topics in African politics. F

5270 Seminar in the Politics of Development (3) Selected topics dealing with political problems of less developed countries. F

5310-20 Seminar in Comparative Government (3, 3) Selected topics in modern governments.

5340-50 Seminar in Latin American Government (3, 3)

5370-60 Seminar in Soviet Politics and Government (3, 3) W

5410-20 Seminar in Public Law (3, 3) Special problems in constitutional and administrative law. F

5440-50 Theory and Analysis of U.S. Foreign Policy Process (4) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. W

5510-20 Seminar in International Organization (3, 3) 5510—Introduction to regional international organizations; political integration at international level. 5520—Functional international organizations.

5540 Seminar in Comparative Public Administration (3) Approaches to and methods used in comparative analysis.

5550 Seminar in Administration in Developing Countries (3)

5600 Public Administration (3) Public administration theory and functions; approaches to public management, contemporary problems in public administration. F

5605 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data. W

5610-20 Seminar in Organization Theory (3, 3) Appraisal of major theories of organization and their applicability to public sector. F

5611-21-31 Seminar in State-Local Administration (3, 3, 3)

5630 Seminar in Technology and Public Policy (3) Technological change and policy process, government interactions with scientific community, political characteristics of scientific enterprise.

5635-45 Operations Research for Public Administrators (3, 3) Operations research methodology; applications and limitations in public sector; linear programming, transportation and assignment problems, network analysis, PERT, dynamic programming and other methods.

5640-50-60 Seminar in Metropolitan Areas (3, 3, 3)

5841 Seminar in Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor.

5670-80 Seminar in Policy Analysis (3, 3) Role of administrators in policy analysis and decision making with special attention to historical and current issues. Sp

5710 Seminar in the Politics of Administration (3) Examination of public administration in context of American political system with emphasis upon policy making and political roles of public administrators and agencies. W

5730 Seminar in Public Budgeting and Fiscal Management (3) Budgetary process, fiscal management, and finance in American government. Sp

5740 Seminar in Organizational Analysis (3) Organization theory applications in public management; field analysis of public organizations.

5750-55 Seminar in Public Management (3, 3) Selected problems. F, W

5765-75 Law and the Administrative Process (3, 3) Constitutional position; decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice. W

5770 Practicum in Public Administration (3) Sp

5785-86 Seminar in Staff Functions (3, 3) Functions of public administration, public bureaucracy, legislative bodies, and advisory and community groups in public sector. Selected topics: budgeting, personnel evaluation, and other staff functions.

5790 Seminar in Personal Personnel Management (3) Functions and organization of personnel administration in public service. Sp

5810 The American Political Process (3) Principal patterns of political activity linking citizens and political institutions. Sp

5820 The American Political Process (4) Selected problems in American politics. Sp

5831-32 The Systematic Study of Politics (3, 3) Scope, methods and procedures of analysis in political science. F, W

5840 Ethics, Values, and Morality in Public Administration (3) Moral and ethical dilemmas confronting administrators in American political system.

5850 Seminar in Comparative State Politics (3) Intensive readings in comparative state politics focusing on environment of state politics, institutions and policy making.

5910-20 Quantitative Political Analysis (3, 3) Methods and techniques in quantitative political analysis. F, W

5930 Topics in Quantitative Political Analysis (3) Selected topics in quantitative methods.

6000 Doctoral Research and Dissertation (3-15) E

6210 Advanced Studies in International Politics (3)

6310 Advanced Studies in Political Theory (4) Research into selected topics.

6410 Advanced Studies in International Organization (3) Research in selected topics.

6440 Advanced Studies in Comparative Politics (3) Research into selected topics. Sp

6510-20 Advanced Studies in American Constitutional Law (3, 3) Systematic investigation of federal relationships, civil liberties, courts in political settings, judicial institutions, personnel, and public policy content.

6510-20 Advanced Studies in Public Administration (3, 3) Research into selected topics. W; Sp

6710 Directed Research in Political Science (3) May be repeated with consent of instructor and student's advisor. Maximum 9 hrs. May be taken for S/NC. E

6810-20 Advanced Studies in the Political Process (3, 3) Open to advanced graduate students upon approval of instructor. F, W

Psychology

MAJOR DEGREES

Psychology

M.A., Ph.D.

Professors:

W. H. Caution (Head), Ph.D. California (Berkeley); G. M. Burghart, Ph.D. Chicago; J. F. Byrne, Ph.D. Tennessee; C. P. Cohen, Ph.D. Kansas; H. J. Fine, Ph.D. Syracuse; S. J. Handel, Ph.D. Johns Hopkins; L. Handler, Ph.D. Michigan State; R. P. Lorion, Ph.D. Rochester; J. L. Loban, Ph.D. Chicago; K. R. Newton, Ph.D. Denver, Ph.D. Pollio; R. D. Michigan; N. L. Rasch, Ph.D. Pennsylvania; F. Samejima, Ph.D. Keio (Japan); R. R. Shrader, Ph.D. Denver, W. S. Verplanck (Emeritus), Ph.D. Brown; R. G. Wither, Ph.D. Washington; J. A. Widerley, Ph.D. Syracuse.

Associate Professors:

J. M. Barlow, Ph.D. Tennessee; E. D. Elliott, Ph.D. Tennessee; M. S. Tennessee; D. S. Freeman, Ph.D. Tennessee; M. G. Johnson, Ph.D. Johns Hopkins; J. Kandilakas, Ph.D. Tennessee; J. E. Lawler, Ph.D. North Carolina; J. A. Lawler, Ph.D. North Carolina; J. L. Lounsbury, Ph.D. Michigan State; A. McIntyre, Ph.D. Yale; J. C. Malone, Ph.D. Duke; W. G. Morgan, Ph.D. Tennessee; M. J. O'Connell, Ph.D. Tennessee; R. S. Sardinas, Ph.D. Florida State; E. D. Sundstrom, Ph.D. Utah; C. B. Travis, Ph.D. California (Davis).

*Part-time

"Alumni Distinguished Professor"
4570 Cognitive Development (4) Theory and research on development of language and thinking in children and adolescents. Prereq: 3210 or 3550.
4710 Physiological Psychology (4) Nervous system and physiological correlates of behavior. Prereq: 1 yr of biology or zoology and 2520. W
4719 Physiological Psychology Laboratory (4) Laboratory study of nervous system and physiological correlates of behavior. Coreq: 4710. W
4720 Comparative Animal Behavior (4) Methods and principles. (Same as Zoology 4720.) F
4729 Comparative Animal Behavior Laboratory (4) (Laboratory and field studies. Coreq: 4720. (Same as Zoology 4729.) F
4756 Evolution and Ontogeny of Social Behavior (4) Genetic, evolutionary, ecological, and developmental processes as they apply to social organization and dynamics of vertebrates. Prereq: Consent of instructor.
4770 Psychology and the Law (4) Psychological aspects of the legal system. Prereq: Junior standing.
4830 History and Systems of Psychology (4) Prereq: 9 hrs of upper division psychology.
4850 Learning Theories (4) Historical and theoretical development of learning models. Prereq: 3210.
4860 Programmed Learning (3) (Same as Curriculum and Instruction 4860.)
4870 Contemporary Research in Behavior of Women (4) Study of interaction of cultural and biological factors in determining the behavior of women, with emphasis on physiological mechanisms involved. Sp
4880 Afro-American Psychology (4) Review and analysis of psychological literature on Afro-Americans. Prereq: Consent of instructor. (Same as Black Studies 4880.)
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
5017 Colloquium in Ethology (1) May be repeated. Maximum 9 hrs. (Same as Zoology 5017.) S/NC only.
5019 Research Practicum (1-3) Required of all first-year students in experimental, physiological, and comparative psychology. May be repeated. Maximum 9 hrs. S/NC only.
5050 Methods of Research in Applied Psychology (3) Techniques and principles for designing and conducting psychological research in natural settings.
5070 Seminar in College Teaching (2) Concepts, methods, and materials in introduction of psychology at college level. Emphasis on research. Required of all Ph.D. candidates. S/NC only.
5079 Practicum in College Teaching (2) Supervised participation in college teaching. S/NC only. Sp
5100 Developmental Psychology (3) Prereq: 3550 or Educational Psychology 2430. (Same as Educational Psychology 5100.) S
5105 Developmental Assessment (3) Techniques for assessing development in infants and children. Does not include practicum. Prereq: 5100 or equivalent and consent of instructor.
5110 Clinical Aspects of Human Sexuality (3) Nature of sexuality; societal perspectives, personal identity, application, intimacy and isolation including psychosocial and psychosocial identity and models for decisions. Intended for graduate students in clinical psychology, social work, and community and mental health professions. Prereq: Consent of instructor.
5111 Seminar in Current Issues in School Psychology (3) Historical, legal, ethical and technological issues in practice of school psychology. Multiple instructors. (Same as Educational Psychology 5111-12-13.) S/NC only. F
5140-50-60 Psychoeducational Assessment (3, 3, 3) Naturalistic, historical, legal, and sociometric assessment methods in school learning environments. Must be taken in sequence. Prereq: Admission to School Psychology Program or consent of instructor. (Same as Educational Psychology 5140-50-60.) F; W; Sp
5149-59-69 Practicum in School Psychology I (2, 2, 2) First-Year School Psychology Program practicum core sequence. Coreq: 5140-50-60. (Same as Educational Psychology 5149-59-69.) S/NC only. F; W; Sp
5170-80-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 5170-80-90.) F; W; Sp
5200 Topics in Developmental Psychology (3) Prereq: 5100 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs.
5300 Readings and Special Problems in Psychology (1-6) May be repeated. Maximum 20 hrs. S/NC only. E
5319 Field Work in School Psychology: Level I (2) Supervised on-the-job training in school psychology. Limited to students admitted to doctoral program in school psychology who are assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 5319.) S/NC only. F, W, Sp
5325 Behavioral Interventions (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Focuses on interventions by people in community (teachers, supervisors, etc.). Includes token economies and strategies for self-control.
5340 Group Dynamics (3) (Same as Educational Psychology 5340.)
5350-50-70 Seminar in Psychology (3, 3, 3) May be repeated. Maximum 18 hrs.
5400 Psychophysiology and Scaling Methods (3) Prereq: One course in statistics.
5420-30-40 Advanced Psychological Statistics (3, 3, 3) Must be taken in sequence. W. Sp; Su
5450 Human Problems in Administration (3) (Same as Management 5250.)
5490 Continuing Education in Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture; topic and format to be announced. Prereq: Graduate standing or consent of instructor. May be repeated. Maximum 9 hrs.
5500 Fundamentals of Psychometrics (4) Basic ideas and orientation in psychometrics. All graduate students who plan to take one or more courses in psychometrics required to take course. Prereq or coreq: 4560.
5510 Instrumentation for Psychological Research (3)
5520 Theory of Mental Measurement (3) Reliability, validity, scaling and equating, norms, combining tests into batteries. Prereq: 1 qtr of graduate-level statistics and 5500 or consent of instructor.
5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 5050-70 or equivalent and consent of instructor.
5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, differential psychology, comparison of different populations in specific psychological parameters. Emphasis on testing of psychological hypotheses in human and animal behavior; reliability theory and regression theory. Prereq: 1 qtr calculus or consent of instructor.
5550 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: 3120. May be used for credit in sociology.

5560 Seminar in Social Psychology (3) Prereq: 5550. May be used for credit in sociology. May be repeated. Maximum 9 hrs.

5580 Theories of Personality (3)

5581-82-83 Clinical Psychology I: Human Development and Personality (2, 2, 2) First quarter core of doctoral program in clinical psychology. Students take 3-2-hr courses concurrently, each covering content area from one to three major contemporary points of view. F

5589 Psychological Techniques Laboratory (2) Basic techniques of psychological appraisal. Restricted to doctoral students in clinical psychology.

5591-92-93 Clinical Psychology I: Patterns of Adaptation (2, 2, 2) Second quarter core of doctoral program in clinical psychology. Students take 3-2-hr courses concurrently, each covering content area from one of three major contemporary points of view. W

5601-02-03 Clinical Psychology I: Behavioral Deviance and Psychopathology (2, 2, 2) Third quarter core of the doctoral program in clinical psychology. Clinical Psychology students must concurrently take each covering content area from one of three major contemporary points of view. Sp

5610-20 Psychological Learning of (3, 3) Prereq: 3210 or Educational Psychology 3730. F, W

5650 Ethics in Professional Psychology (2) Review of ethical concerns in professional psychology. Multiple instructors. Meets 3 hrs per week. Sp

5670 Forensic Psychology (2) Psychologist's role in relation to law, including questions concerning licensure requirements, legal restrictions, and testimony as expert witness. Offered in alternate years. Prereq: M.A. in psychology or equivalent.

5680 Neural Basis of Behavior (3) Neuroanatomy; basis and symptomatology of neurological syndromes encountered in clinical psychology. Prereq: M.A. in psychology or equivalent.

5690 Psychopharmacology (3) Review and evaluation of pharmacology as it relates to psychology. Prereq: Consent of instructor. Offered in alternate years. Sp, A

5702 Community Psychology (3) Psychological aspects of research, evaluation, intervention, and planning in communities. Community ecology, systems, primary and secondary prevention, planning of social systems, and relevance of federal policies. Prereq: Consent of instructor.

5713 Learning Modules for Techniques in Professional Psychology (3) Development of learning modules; each develops skill in assessment, technology, child therapy, or pathology. Prereq: Consent of instructor. May be repeated. S/NC only.

5750 Ethological Psychology (3) Evolutionary and physiological basis of comparative psychology and implications for human behavior. Prereq: Introduction to neuroanatomy and neurophysiology.

5760 General Vertebrate Neuroanatomy (3) Lecture and laboratory dealing with structure and function of central and peripheral nervous systems. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 4760.)

5789 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory procedures central to research in physiological psychology. Prereq.: 4710, 4719, and consent of instructor. May be repeated with consent of instructor.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) (Same as Speech Pathology 5790.)

5840 Student Appraisal (3) (Same as Educational Psychology 5840.)


5859-60-79 Practicum in Psychological Appraisals (2, 2, 2) Ordinarily to be taken concurrently with 5850-60-70.

5890 Counseling Theories and Techniques (3) (Same as Educational Psychology 5890)

5950-60 Theory and Practice of Consultation (3) Issues in consultation, models of consultation process, and evaluation of counseling techniques. Must be taken in sequence. Coreq: 5959-69 and consent of instructor. (Same as Educational Psychology 5950-60.) W, Sp

5959-69 Practicum in Psychological Appraisal (2, 2) Coreq: 5950-60-70. Prereq: Consent of instructor. Must be taken in sequence. (Same as Educational Psychology 5959-69.) S/NC only. W, Sp

6000 Research and Dissertation (3-15) E

6050 Seminar on Methods of Social Research (3) (Same as Sociology 6050.)

6089 Internship in Community Psychology (1-6) Supervised employment at departmentally approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6099 Internship in School Psychology (1-6) Supervised employment at departmentally approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6100 Seminar in Community Psychology (3) Evaluation, research, intervention, and systems for delivery of services in communities. Prereq: 5702

6180 Seminar in Program Evaluation (3) Techniques for designing and conducting research to evaluate effectiveness of programs. Prereq: Statistics 5050-60-70 or equivalent and consent of instructor.

6159 Practicum in Program Evaluation (3) Designing, conducting, and analyzing results of program evaluation in school or community setting. Prereq: 6150 and consent of instructor.

6210-20 History, Systems, and Theories in Psychology (3, 3) Prereq: M.A. in psychology or equivalent. Must be taken in sequence.

6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 6250-60-70.)

6280-90 Factor Analysis (3, 3) Factor analysis; component analysis; introduction to latent structure analysis. Prereq: 4640 and 5500

*6310 Seminar in Motivation and Emotion (3)

*6319 Field Work in School Psychology: Level II (2) Supervised on-the-job traineeship in school psychology for students fully admitted to doctoral program in School Psychology assigned to program approved field settings. Prereq: 5950-60. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 6319.) S/NC only. F, W, Sp

*6320 Seminar in Research Methods (3)

*6320 Seminar in Learning (3)

*6340 Seminar in Developmental Psychology (3)

*6350 Seminar in Thinking (3)

*6360 Seminar in Sensation and Perception (3)

*6370 Seminar in Theoretical Psychology (3)

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

6385 Hypnosis and imagery (3) Demonstration and practice of hypnotic induction methods, survey of clinical application of hypnosis and imagery. Prereq: Consent of instructor.

*6390 Seminar in Psychotherapy (2) Treatment of current case, focusing upon psychodynamics, psychopathology, and therapeutic techniques employed. Prereq: Consent of instructor.

*6395 Seminar in Assessment (3) Seminar for advanced graduate students in clinical psychology, to deal with current research on methods of evaluating the status of individuals seeking clinical aid.

*6400 Seminar on Changing Concepts in Clinical Psychology (3) New theories and ideas in relation to their impact on experimentation and systems of thought. Prereq: M.A. in psychology or equivalent.

6455 Seminar in Psychopathology (3) Prereq: Consent of instructor.

6410-20-30 Psychotherapy (3, 3, 3) Theories and principles of psychotherapy. Prereq: 5960-90. Prereq or coreq: 5860-80. W, Sc, F

6411-12-13-14 Psychotherapy: Elective Concentration Learning Laboratory (2, 2, 2, 2) Typically four psychotherapy concentration areas offered each quarter. Clinical students in core psychotherapy sequence must elect at least one of these in each quarter of sequence. May be limited. Limited to clinical psychology students enrolled in core psychotherapy sequence or consent of instructor.


6450-60 Advanced Psychometrics (3, 3) Construction and standardization of psychological tests, personality questionnaires, and rating scales; theory of errors or measurement; item analysis, scaling, equating, and norms development. Prereq: 4650, 5440, and 5560. May be repeated. Maximum 9 hrs.

6491-2-3-4 Field Placement in Clinical Psychology Levels 1, 2, 3, 4, (1-8, 1-8, 1-8, 1-8) Supervised clinical experience. Required of and limited to students fully admitted to Ph.D. program in Clinical Psychology. May be repeated. Maximum 8 hrs per course. S/NC only. W, Sp, F

6500 Seminar in Psychometrics (3) Seminar for advanced graduate students in psychometrics or quantitative psychology, to deal with advanced theories, methodologies, and their applications. Prereq: 4640, 5500 or equivalent, and consent of instructor. May be repeated. Maximum 9 hrs.

6550 Seminar in Advanced Social Psychology (3)

6575 Seminar in Mental Health Administration (3) Theory and problems in organization and management of mental health administration.

6702 Social Ecology (3) Seminar on current topics: ecological psychology, quality-of-life, social impact assessment, and environmental classification. Prereq: Consent of instructor.

*6710 Seminar in Physiological Psychology (3)

*6720 Seminar in Comparative and Ethological Psychology (3)

*6730 Methods of Ethological and Naturalistic Research (3) Current laboratory and field techniques. Prereq: 4729, 5750, 6720, or consent of instructor.

6780 Advanced Psycholinguistics (3) Language from psychological and associated points of view, methodological and theoretical problems.

*6900 Field Work in Industrial and Organizational Psychology (1-15) (Same as Management 6900.) Note: Psychology 5300, 6310-400, 6419-29-39, 6710-20-30, and/or 6990 may be repeated for credit with the approval of the department.
Radiation Biology (Interdepartmental)

5000 Thesis (1-15) E
5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs. E
5610-20 Foundations of Radiation Biology (4, 4) (Same as Zoology 5610-20.)
5790 Radiation Physiology (4) (Same as Zoology 5790.)
6000 Doctoral Research and Dissertation (3-15) E
6910 Seminar in Radiation Biology (2) (Same as Zoology 6910.)

Religious Studies

Professors:
C. H. Reynolds (Head), Ph.D. Harvard; D. L. Dunham, Th.D. Harvard; W. L. Humphreys, Ph.D. Union; D. E. Linge, Ph.D. Vanderbilt; F. S. Lusby, B.D. Colgate Rochester; R. V. Norman, Jr., Ph.D. Yale.

Assistant Professors:
R. R. E. Earl, Ph.D. Vanderbilt; J. L. Fitzgerald, Ph.D. Chicago; J. Kim, Ph.D. Chicago.

An M.A. in Philosophy with a concentration in religious studies is available for graduate work in this related field. (Details of this program are available in the office of either department.) Graduate courses in religious studies further provide opportunities for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

3060-70-80 History of Western Religious Thought and Institutions (3, 3, 3) 3060 — First Century to Fifth Century 3070—Sixth Century to Fifteenth Century 3080—Sixteenth Century to 1900. (Same as History 3060-70-80.) A
3210 Early Greek Mythology (3) (Same as Classics 3210.) F
3220 Early Greek Mythology in the Classical Period (3) (Same as Classics 3220.) W
3230 Roman Mythology (3) (Same as Classics 3230.) Sp
3270 Russian Philosophical and Theological Thought (4) (Same as Philosophy 3270 and Russian 3270.) J
3411-12 The Reformation (3, 3) (Same as History 3411-12.) J
3440 Religion of Primitive Peoples (3) (Same as Anthropology 3440.)
3650 Philosophy and Religion in India (4) (Same as Philosophy 3650.) F
3660 Buddhist Philosophy and Religion (4) (Same as Philosophy 3660.) W
3671 Religion and Philosophy in China (4) (Same as Philosophy 3671.)
3690 Philosophy of Religion (4) (Same as Philosophy 3690.)
4111-21 Modern Religious Philosophies (4, 4) Examination of the religious implications of major thinkers and movements. 4111—Nicolas of Cusa to Hume. 4121—Kant and the nineteenth century. Prereq: 9 hrs of philosophy other than logic. (Same as Philosophy 4111-12.)
4200 Classical Indian Systems of Philosophy: The Moksha Tradition (4) Basic writings and philosophic problems of the traditions of Samkhya, Yoga, and Vedanta. Prereq: 3650 or 3660. (Same as Philosophy 4200.)
4210 Topics in Ancient Israelite and Ancient Near Eastern Religion (4) Prereq: 3110-20 or consent of instructor. May be repeated. Maximum 8 hrs.
4310 Jesus and Paul Compared (4) Jesus’ teaching and activity in the context of first-century Palestine Judaism; analysis of what the Apostle Paul made of the tradition of and about Jesus. Recommended prereq: 2610 or 2611.
4370 Theoretical Issues in Medical Ethics (4) (Same as Philosophy 4370.)
4410 American Religious Thought (4) Selected figures, movements and problems in American religious thought from colonial period to present.
4450 Topics in American Religion (4) Prereq: One of the following: 3510, 3520, 4410, or consent of instructor. May be repeated. Maximum 8 hrs.
4540 Social and Religious Change (4) (Same as Sociology 4540.)
4610 Topics in Western Religious Thought and Institutions (4) Selected figures, issues, and institutions. Prereq: 3110-20 or consent of department. May be repeated. Maximum 12 hrs.
4640 Topics in Early Christianity and Hellenistic Religion (4) Selected figures, issues, and institutions. Prereq: 3110-20 or consent of department. May be repeated. Maximum 12 hrs.
4670 Topics in Eastern Religions (4) Selected figures, issues, and institutions. Prereq: 3110-20 or consent of department. May be repeated. Maximum 12 hrs.
4810-20-30 Readings and Research in Religious Studies (3-4, 3-4, 3-4)
4840 Readings in Selected Languages Related to Religious Studies (3-4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
4840 Sociology of Religion (4) (Same as Sociology 4940.)
4950 Theory of Religion (4) Elements for constructing a theory of religion drawing on resources from fields of psychosocial, social psychology, sociology of religion, cultural anthropology, theology and comparative religion.
4960 Tradition, Change and Modernity in Asia (4) Comparative study of processes of religious and social change seen in historical context in Asian societies. Comparative focus will vary each year (e.g., China and Japan, India and South Asia). May be repeated. Maximum 8 hrs. (Same as Sociology 4960.)
5101 Foreign Study (1-12) See page 97.
5102 Off-campus Study (1-12) See page 97.
5103 Independent Study (1-12) See page 97.
5310-20 Topics in Religion and Society (4, 4)
5350 Orientation to Medical Ethics (2) (Same as Philosophy 5355.)
5510-20 Topics in the History of Religion (4, 4)
5710-20 Topics in Religious Thought (4, 4)

Romance Languages

MAJORS

DEGREES

French
M.A.
M.A., Ph.D.

Spanish
M.A.
M.A., Ph.D.

Professors:

Associate Professors:
W. H. Heflin (Head), Ph.D. Florida State; W. F. Byess (Emeritus), Ph.D. Wisconsin; R. M. DeRycke, Ph.D. Illinois; K. D. Levy, Ph.D. Kentucky; C. Pinksky, Ph.D. California (Berkeley); Y. M. Washburn, Ph.D. North Carolina.

Assistant Professors:
A. S. Allen, Ph.D. California (Berkeley); T. R. Arrington, Ph.D. Kentucky; E. J. Carpen, Ph.D. Yale; D. M. DiPuccio, Ph.D. Kansas; M. H. Handelsman, Ph.D. Florida; B. S. West, Ph.D. North Carolina.

The Department of Romance Languages offers two advanced degrees: the Master of Arts (M.A.) in French and Spanish; and the Doctor of Philosophy (Ph.D.) in Spanish.

THE MASTER OF ARTS PROGRAM

The student may select either Plan A or B:

Plan A
1. Completion of a minimum of 36 quarter hours of which 24 must be taken in courses numbered above 5000, including 5011 (French or Spanish, as appropriate).
3. A written examination covering the course work and selected items from a master reading list.
4. A final oral examination covering the thesis.

Plan B
1. Completion of 45 quarter credits of which 33 must be in courses beyond 5000, including 5011 (French or Spanish, as appropriate).
2. Three term papers that have been accepted as satisfactory by the Advisory Committee.
3. A written examination covering the course work and selected items from a master reading list.

THE DOCTORAL PROGRAM

Residence and Course Work:
Completion of at least three consecutive quarters of full-time residence, a minimum of 81 credit hours in course work beyond the Bachelor's degree or its equivalent, and a dissertation (36 credit hours).

No less than 54 quarter hours should be taken in courses pertaining to the student's major field; of these a minimum of 18 hours are to be taken in courses above 6000, a maximum of 12 hours may be taken in courses of the 4000 level and the rest in courses above 5000. All students must complete the series in methods of research (5151-61-71) for a total of 3 credits. The minor shall consist of at least 18 hours of which at least 12 hours must be numbered above 5000 and the rest above 4000, and should represent a meaningful complement to the student's area of concentration. In addition 9 hours of courses above 4000 in a related discipline are required. In special cases the latter requirement may be waived in favor of additional course work in the major field.

Language Requirements:
Students are expected to demonstrate written and oral facility in Spanish as well as knowledge of two other foreign languages. One of these must be French; the second one should be chosen from such languages as German, Italian, Portuguese, Arabic or Hebrew in accordance with the student's field of concentration. Proficiency in Latin shall be required of all students specializing in an area related to philology or the medieval period.
Examinations: A comprehensive examination, both written and oral, covering the major and minor fields must be passed before a student can become an official candidate for the degree. This examination is to be held at the time deemed most appropriate by the student's major advisor and committee. The candidate is expected to defend the dissertation in a final oral examination.

For additional information on the program, consult pages 19-20.

French

3010-20-30 Elements of French for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for those having had Elementary French. No auditors. F; W; Sp; Su

4001-02-03 Introduction to Consecutive and Simultaneous Translation (3, 3, 3) Oral translation into English; 4002—Consecutive translation to and from English; 4003—Simultaneous translation to and from English, and vice versa on variety of practical subjects such as business, economics, politics, and sciences. Given mainly in language lab with additional classroom supervision by instructor. Prereq: 3430 or equivalent. Must be taken in sequence.

4100-02-03 Introduction to Classical Latin Through Vulgar Latin (3) Development of Classical Latin through Vulgar Latin. Required of all MA and PhD students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department. Prereq: Intermediate Latin or equivalent. A

4150 Theatrical French (1-3) Performance in one or more French plays. Prereq: Intermediate French or equivalent and consent of instructor. May be repeated with consent of department. A

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. F; W; Sp

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. A

4220-30-40 Advanced Grammar (3, 3, 3) Prereq: 2130, 2520, or equivalent. W; Sp

4250 Introduction to Descriptive Linguistics (3) Phonetics and phonemics, morphology and syntax. Types of languages, linguistic groups, dialects and dialect geography. Application of descriptive linguistics—field linguistics, dialect study; its practical use in learning languages and in language teaching. Introduction to transformational grammar. Prereq: 9 hrs of upper division English or 9 hrs of upper division courses in a modern or ancient language, 18 hrs of German and French 3010-20-30, courses in literature, in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as German, Italian, and Spanish 4250.) F

4260 Introduction to Historical and Comparative Linguistics (3) Same as German, Russian, Spanish and Italian 4260.) W

4270 Introduction to Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into the major Romance languages. (Same as Spanish and Linguistics 4270.) Sp

4310-20-30 French Literature of the Eighteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4350-60-70 Medieval French Literature (3, 3, 3) Medieval works in modern French texts. Prereq: Intermediate French or equivalent. A

4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent. A

4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4640-50-60 French Literature of the Sixteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Prereq: 9 hrs of upper division English or 9 hrs of major works

5003 Independent Study (1-3) Prereq: 9 hrs of upper division English or 9 hrs of major works

5102-30 Old French (3, 3, 3) Medieval French language and literature. A

5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects and beginning literature. Required of all MA and PhD students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department. A

5181-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as Italian and Spanish 5151-61-71.) S/NC only. A

5210-30-40 French Literature of the Sixteenth Century (3, 3, 3) A

5211-31 Seventeenth Century French Literature (3, 3, 3) Detailed analysis of French poems, plays, and prose works of seventeenth century. 5211—Descartes and Pascal; 5221—Classical French theatre; 5231—French prose writers of the seventeenth century. A

5241 French Theatre of the 18th and 19th Centuries (3) Development of new dramatic forms and evolution of traditional forms in serious and comic theatre of eighteenth and nineteenth century France. A

5310-20-30 French Directed Readings (3, 3, 3) E

5350-60-70 The Philosophes (3, 3, 3) Textual analysis of the works of Voltaire, Diderot, Rousseau, and other eighteenth-century writers. A

5410-20-30 The Novel (3, 3, 3) A

5450-60 Lyric Poetry of the Nineteenth Century (3, 3, 3) 5450—German and English influences on French Romanticism and generation of the poets of "le mal du siecle." 5450—Victor Hugo; the Parnassians. A

5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and Petits poemes en prose with emphasis on theories of color and "correspondances" and their influence on Symbolist school. A

5510-20-30 Trends in Contemporary French Literature (3, 3, 3) A

5580-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories. A

5670 Problems in Romance Linguistics (3) Topics vary. May be repeated with consent of department. Prereq: 4270 or equivalent. (Same as Spanish 5670.) A

5710-20-30 Seminar in French Literature (3, 3, 3) Topics vary. May be repeated with consent of department. Su

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as Spanish 5910.) A

Italian

3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian or equivalent. Recommended for literature majors. F; W

4010-20-30 Italian Drama in English Translation (3-4, 3-4, 3-4) 4010—La commedia dell’arte and major works of Machiavelli, Metastasio, Alfieri, Goldini. 4020—Twentieth-century theatre; operatic drama, the Grottesco, Pirandello, De Filippo, Fratti. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs. A

4510-60-70 Dante and Medieval Culture (3, 3, 3) Readings and lectures in English for students majoring or minoring in other departments. Readings, reports, and term papers in Italian for students majoring or minoring in Italian. (Same as Comparative Literature 4505-60-70.) A

4220 Petrarch (3) Prereq: 3130, 3520 or equivalent. A

4230 Boccaccio (3) Prereq: 3130, 3520 or equivalent. A

4330 History of Italian Language (3) Prereq: 3130, 3520 or equivalent. A

4410-20-30 Literature of the Rinascimento (3, 3, 3) From Pucil to Tasso, the Quattrocento and the Cinquecento. Prereq: 3130, 3520 or equivalent. A

4530 The Modern Novel (3) Prereq: Intermediate Italian or equivalent. A

4540 The Modern Theatre (3) Prereq: Intermediate Italian or equivalent. A

4610 Contemporary Theatre (3) Prereq: Intermediate Italian or equivalent. A

4620 Contemporary Poetry (3) Prereq: Intermediate Italian or equivalent. A

4630 Contemporary Prose (3) Prereq: Intermediate Italian or equivalent. A

4760 Italian Folklore (3) Folk arts, music, traditions, rituals and lore of Italy from Middle Ages to present. (Same as Anthropology 4760.) A

5011 Techniques in Literary Analysis (2) Intensive course in explication de texte. A

5100 Contemporary Poetry (3) Prereq: Intermediate Italian or equivalent. A

5150 The Modern Novel (3) Prereq: Intermediate Italian or equivalent. A

5111-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Spanish 5151-61-71.) S/NC only. A

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Spanish 5151-61-71.) S/NC only. A

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Spanish 5151-61-71.) S/NC only. A

5910-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department. A
5710-20-30 Seminar in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department. A

Portuguese

3510-20 Aspects of Portuguese Literature (4, 4) Prereq: Intermediate Portuguese or equivalent. Recommended for literature majors. F, W

4310-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) May be repeated with consent of instructor. F, W, Sp

5101 Foreign Study (1-12) See page 97. E

5102 Off-campus Study (1-12) See page 97. E

5103 Independent Study (1-12) See page 97. E

Spanish

4030 Masterpieces of Spanish Literature in English Translation (3) No foreign language credit. A

4059-60-70 Hispano-Arabic Literature and Culture (3, 3, 3) A

4110-20-30 Spanish Literature of the Golden Age (3, 3, 3) The picaresque novel; Cervantes; the Comedia. A

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Sub恋爱 change from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. F; W; Sp

4210 Phonetics (Prereq: 2130, 2520, or equivalent. F

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. W, Sp

4250 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Linguistics 4250.)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, Linguistics 4260.) W

4270 Introduction to Romance Linguistics (3) (Same as French and Linguistics 4270). Sp

4410 Spanish Civilization (3) Prereq: Intermediate Spanish or equivalent. F

4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent. W, Sp

4450-70 Studies in Modern Spanish Style (3, 3) Prereq: 4110-30 or consent of instructor. A

4510 Special Topics in Nineteenth Century Spanish Literature (3) Prereq: knowledge of the major works of the period and ability to read Spanish at approximately the level of the course. May be repeated with consent of department. Maximum 6 hrs. A

4710-20-30 Spanish Literature of the Twentieth Century (3, 3, 3) 4710-20-30 Non-dramatic prose fiction. 4720-Drama. 4730—Lyric poetry. Prereq: Intermediate Spanish or equivalent. A


5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. 5000 only. E

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. An intensive course in explication de texte. F

5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) 5070—General culture history, philosophy in Arab Spain. 5080—Development of traditional marketplace story, or epicidal prose narrative, into modern novel of character after invention of printing. 5090—Mutual influence of traditional Arabic poetry and popular and native Spanish choral lyric; development of classical mowahshah, the colloquial zajal, and the vernacular romantic novellas. 5100—Nezahualcoyotl and Spanish. (Same as Arabic 5070-80-90.) A

5101 Foreign Study (1-12) See page 97. E

5102 Off-campus Study (1-12) See page 97. E

5103 Independent Study (1-12) See page 97. E

5110-20-30 Old Spanish (3, 3, 3) Medieval Spanish language and literature. A

5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and administering literary language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department. F

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Italian 5151-61-71.) S/NC only. A

5211-21 Don Quixote (3, 3) Must be taken in sequence. A

5212-32 Golden Age Prose (3, 3) 5212-32 La Celestina; critical study of Fernando de Rojas' life and work. Celestinesque genre; Feliciano de Silva's Second Celestina; 5250—Guzmán de Alfarache and Spanish picaresque genre. A

5250-60 The Generation of '98 (3, 3) Angel Ganivet, Giner de los Rios, Baroja, Unamuno, Valle Inclan, Benavente, Azorin, Perez de Ayala. A

5270 The Contemporary Novel (3) Civil War and post-Civil War period. A

5310-20 Directed Readings (3, 3) E

5311-21 Special Topics in Spanish or Spanish American Literature (3, 3) May be repeated. A

5340 Problems in Hispanic Culture (3) Prevailing social, political, artistic, literary and ideological conditions and patterns of any area or period within Spanish or Latin American culture. May be repeated with consent of department. Maximum 6 hrs. A

5510 Special Topics in the Spanish Theatre after the Golden Age (3, 3) Spanish theatre from eighteenth century to present. May be repeated with department consent. A

5550-60 The Golden Age Theatre (3, 3) 5550-60 Introduction to Spanish Theatre, Lope and Tirso. 5560—Castro, Alarcón, Moreno and Calderón. A

5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay. A

5611-21 Spanish American Lyric Poetry (3, 3) A

5620-30 The Modern Novel in Spanish America (3, 3) A

5631 Spanish American Essay (3) A

5632 The Spanish American Short Story (3) Short story as major literary genre in Spanish America. Reading and criticism of works of authors such as Dario, Quiroga, Borges, Arreola, and Rulfo. A

5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos Solorzano, Rodolfo Usigli, Conrado Nale Roxlo, Roberto Cass, Rene Marques and Sebastien Salazar Bondy. Presentation of films as adaptations of classics such as Doña Bárbara, Los de abajo and Don Segundo Sombra as well as exponents of experimental cinema of today. A

5640 Latin American Women Writers (3) Feminine point of view, modern image of woman, male-female relationships, social and political aspects of the modern world. A

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in compositions, sketches, and original storied. A

5670 Problems in Romance Linguistics (3) (Same as French 5670.) A

5810-20-30 Spanish Lyric Poetry (3, 3, 3) A

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as French 5910.) A

6000 Doctoral Research and Dissertation (3-15) E

6210-20-30 Seminar in Spanish Literature (3, 3, 3) Topics vary in field of Peninsular literature. May be repeated with consent of department. A

6310-20-30 Seminar in Latin American Literature (3, 3, 3) Topics vary. May be repeated with consent of department. A

Russian

See German

Sociology

MAJOR DEGREES Sociology

M.A., M.A.T., Ph.D.

Professors: D. R. Ploch (Head), Ph.D. North Carolina; J. A. Black, Ph.D. Iowa; D. J. Champion, Ph.D. Purdue; L. Ebersole, Ph.D. Pennsylvania; N. Shover, Ph.D. Illinois; S. Wallace, Ph.D. Minnesota.


Assistant Professors: S. C. Fisher, Ph.D. California (San Diego); S. Kurth, Ph.D. Illinois; K. Ritter, Ph.D. Washington; K. Van Liere, Ph.D. Washington State.

For a full statement of departmental requirements, students are referred to the Departmental Graduate Manual. All registration for 3000- and 4000-level courses require the consent of the instructor.

THE MASTER'S PROGRAM

The department offers both a thesis and non-thesis option for a Master's degree. For information concerning the Master's degree with thesis, see the General Requirements on page 18. Those interested in the non-thesis option should obtain details from the department.

THE DOCTORAL PROGRAM

General requirements for the degree of Doctor of Philosophy are described on page 19. Additional specific requirements for the degree of Doctor Philosophy in Sociology include:

1. A minimum of 108 credit hours following the Bachelor's degree, exclusive of credits for the Master's thesis, is required. Of this number, 36 hours shall be allocated to doctoral research and dissertation. A maximum of 12 hours credit outside the major may be taken in related fields, with the approval of the student's committee.

2. A written comprehensive examination covering sociological theory, research methodology, and two other areas in sociology.
must be passed prior to admission to candidacy. This examination must be passed not later than one academic year before the date on which the degree is granted.

3. No later than one month before granting of the degree, the candidate will be required to pass an oral examination on the doctoral dissertation. May be repeated with different instructors. Maximum 6 hrs.

5010 Professional Seminar (1) Limited to sociology graduate teaching assistants and graduate assistants. May be repeated. Maximum 4 hrs. S/NC only. W, Sp

5040 Methodological Issues in Social Research (3)

5050 Seminar in Political Sociology (3) Political system from societal, organizational, and group perspectives.

5069-70 Special Social Investigation (3, 3) Directed readings and/or research projects. E

5125 Seminar in Environmental Sociology (3)

5200 Seminar in Collective Behavior and Social Movements (3)

5210 Social Theory (3) F

5220 Social Control (3)

5250 Seminar in Sociology of Medicine (3) May be repeated with different instructors. Maximum 6 hrs.

5251 Historical Demography (3) Family reconstitution, aggregate analysis, strategies for examining documents containing information on population. Research findings on historical patterns of change in fertility, mortality, migration and different types of family structure. A

5310 Seminar in Methods of Sociological Research (3) Major methodological issues in sociology; scaling techniques; reliability, validity, sampling, and qualitative methodology.

5320-30 Social Statistics (3, 3) General survey of parametric and nonparametric procedures in analysis of sociological data; assumptions underlying procedures; advantages, disadvantages, and special applications. Must be taken in sequence. F, W

5420-30 Social Theory (3, 3) W: Sp

5520 Crime, Law, and Social Control (3)

5530 Seminar in Community (3)

5550 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in communities.

5560-70 Field Research in Deviance (3, 3)

5580 Sociology of Mental Disorder (3) Relationship between formal sociological models and substantive theories of mental illness. Historical development of theoretical conceptualizations. Interdependence of theory and therapeutic techniques. Epidemiology of mental disorders. Review of major studies.

5590 Social Differentiation and Stratification (3) Exogenous sources of differentiation in society, their relation to conflict in society, and their relationship to class structure in society.

5610 Seminar in Occupations (3) Occupations and their relation to individual and society; technology and occupations; unequal rewards and occupations; social organization and occupations.

5620 Seminar in Occupations (3) Continuation from material in Sociology 5610; interface between occupations and settings in which they are performed.

5630 Seminar in Occupations (3) Research participation; directed projects on subjects developed in seminar.

5640 Theories of Social Psychology (3) Current and classical theoretical perspective in social psychology. May be used for credit in psychology.

5670 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5720 Social Interaction (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to test selected theoretical problems. May be repeated. Maximum 6 hrs.

5730 Seminar in Research Problems in Inter-

group Relations (3) Research techniques and problems as encountered in race and intergroup relations are explored; actual field research projects are performed.

5810 Seminar in Race and Culture (3) Critical examination of theoretical and conceptual approaches in study of intergroup relations. A

5810 Urban and Regional Sociology (3)

5920 Seminar in Social Attitudes (3)

5940 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delinquency, research findings related to them, and their implications for formal strategies of control and rehabilitation.

5960 Demographic Techniques (3) Life, table, standard rates, and survey techniques of population analysis. A

5970 The Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Relations between urbanization, industrialization, and modernization.

6000 Doctoral Research and Dissertation (3-15) E

6040 Experimental Research (3)

6050 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychology 6040.)

6070 Field Research (3)

6100 Reading in Social Psychology (3) Directed readings and selected topics in social psychology. May be repeated. Maximum 6 hrs.

6100-100 Survey Design and Analysis (3, 3) Application of general methodological principles to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtrs).

6130 Seminar in Mass Behavior and Related Topics (3)

6140 Advanced Readings in Sociological Theory (4) S/NC only. E

6150 Advanced Readings in Sociological Methods (4) S/NC only. E

6160 Advanced Special Social Investigation (4) E

6170 Cross-cultural Aspects of Human Fertility (3) Historical, topical, regional, and methodological approaches to human fertility and demographic problems. Consideration of relations obtained between socioeconomic and demographic change in various parts of world; fertility rates and national power; controversies on control of vital rates of growth.

6180 Theory and Method of Human Ecology (3) Theoretical perspective and research techniques of human ecology applied to selected research sites.

6190 Advanced Special Social Investigation (4) E

6200 Topics in Socialization (3) Process to learn cognitive systems and forms of behavior of social world. Examination of main currents in socialization theory and research. May be repeated with different instructors. Maximum 6 hrs.

6240 Theory and Research in Human Migration (3)

6510 Advanced Issues in Criminological Theory (3) Emphasis on problems related to theory construction and measurement.

6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding cause and procedures and programs for social control. Prereq: 4310 and 5520.

6530 Sociology of Law (3) Analysis of social and cultural factors influencing emergence and maintenance of law as social institution and affecting relations between law and deviant behavior; appraisal of
The Department of Speech and Theatre offers the Master of Arts degree in Speech and Theatre with area concentrations in speech communication and theatre and the Master of Fine Arts in Theatre with area concentrations in acting and directing, playwriting, and design and technical theatre.

In their prospective concentrations at the Master's level, i.e., speech or theatre, applicants must have completed undergraduate degrees approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee, Knoxville.

The Graduate Record Examination is required of all applicants. All M.F.A. applicants must submit two letters of recommendation. Auditions before appropriate faculty are required of M.F.A. acting/directing applicants. Applicants for admission to M.F.A. design/technical theatre and playwriting programs must submit samples of their work.

For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Speech and Theatre.

MARTER OF ARTS DEGREE

CURRICULUM

The departmental requirement for the M.A. degree in Speech and Theatre is 45 quarter hours (inclusive of hours taken toward a minor), at least 23 hours of which must be earned in courses numbered 5000 or above. Only 9 hours of thesis credit (Speech and Theatre 5000) may be included in the 45-hour minimum for the degree. Speech and Theatre 5110 is required of all M.A. students. Area concentration requirements are as follows:

Speech Communication

(1) 15 hours in theatrical history and criticism.
(2) At least 9 hours (and no more than 12 hours) in performance and production courses may be included in the 45-hour minimum for the degree.
(3) No more than 6 hours in projects courses.

MARTER OF FINE ARTS DEGREE

CURRICULUM

At least 60 quarter hours, 30 of which must be at the 5000 level or above, are required for the Master of Fine Arts degree in Theatre. The number of hours each student will carry per quarter will vary with the student’s concentration. The distribution of courses within the department may necessitate some students' accumulating more than 60 hours in order to earn the degree, but no student should require more than two years to finish the program. Ten to twelve hours of theatre history during the first year of residence are mandatory for all students unless appropriate undergraduate coursework is evidenced. Theatre 5011-12-13 is required of all except acting students. Students will be admitted to the directing concentration only by petition after the first year of the acting/directing program is completed.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a Master's or a doctoral degree may apply up to 15 credit hours from the previous graduate program to the MFA degree, with approval of the student's committees, the Dean of the College of Liberal Arts, the Dean for Graduate Studies and/or the Vice Chancellor for Graduate Studies and Research.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum, and must have been earned within the time limits (6 years) established for completion of the MFA degree.

Speech

4222 Advanced Argumentation and Debate (4)

4461 Quantitative Research Methods in Speech Communication (4) Designing experiments; planning field studies; using statistical analysis.

4511 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211.

4560 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public addresses in campaigns for women's rights from the 1830s to present. F

4571 British Oratory (4) Historical and critical study of British public address. Sp, A

4591 Persuasive Uses of Imaginative Literature (4) Topics in social and political uses of novels, plays, and poems. W

4811 Advanced Phonetics (4) Phonetica aspects of contemporary dialects of the English language. Prereq: Consent of instructor, Sp, A

4930 Studies in American Public Address (4) May be repeated. Maximum 12 hrs.

4999 Colloquium in Speech Communication (1) May be repeated. E

5140 Communications Theory (3) Analysis of contemporary theories of human communication, emphasizing similarities and differences of communication processes in intrapersonal, interpersonal, and mass communication systems. F

5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs. Sp

5220 Quantitative Projects in Speech Communication (3) May be repeated. Maximum 9 hrs. E

5440 Organizational Communication (3) May be repeated. Maximum 9 hrs. F

5550-60-70 Studies in Persuasion (3, 3, 3) W

5750-60-70 Studies in Rhetoric (3, 3, 3) F

5911 Directing the Forensic Program (4) Philosophy and methods of directing cocurricular and extracurricular forensic activities in high schools and colleges: competitive and noncompetitive approaches to directing debate, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911) Sp

Speech and Theatre

4170-80-90 Film History and Theory (3, 3, 3) Analysis of cinematic forms and styles. 4170—Narration. 4180—Exposition and persuasion. 4190—Experimental forms; films and other media.
4441-42 Advanced Play Directing (4, 4) Problems of play interpretation; directing period plays; preparation of a play for public performance. Prereq: 3451-52 and consent of instructor. Must be taken in sequence. F; W.

5412-42 Advanced Theatre Costume Design (4, 4) Advanced problems in costume design and construction, pattern drafting, draping. Prereq: 3511 or 3512.5 W; Sp.

4751-52 Dramatic Theory and Criticism (3, 3) W

4951-52 Playwriting (4, 4) Prereq: Consent of instructor. F; W.

5011-12-13 Projects in Lieu of Thesis (3, 3, 3) Available to Theatre M.F.A. students only.

5250 Seminar in Playwriting (3) Sp.

5310 Studies in European Theatre History (3) May be repeated. Maximum 9 hrs. F, W.

5320 Studies in American Theatre History (3) May be repeated. Maximum 9 hrs. F, W.

5620 Projects in Lighting Design (3) May be repeated. Maximum 9 hrs. E.

5830 Projects in Play Directing (3) May be repeated. Maximum 9 hrs. E.

5640 Projects in Scene Design (3) May be repeated. Maximum 9 hrs. E.

5650 Projects in Costume Design (3) Problems of play interpretation and theatrical costume design centralizing around individual projects. Students will design costumes for complex play for public performance. May be repeated. Maximum 9 hrs. E.

5660 Projects in Technical Theatre (3) Problems of set design, interpretation, and execution. E.

5670-71-72-73-74-75 Master Class in Acting (5, 5, 5, 5) Available to Theatre M.F.A. students only.

5850 Studies in Theatre Production (3) May be repeated. Maximum 6 hrs.


5912 Play Production in Secondary Schools (4) Principles and methods for directing high school dramatic programs. (Same as Curriculum and Instruction 5912.) Su.

5950-60-70 Studies in Dramatic Theory and Criticism (3, 3, 3) F; W.

Speech Pathology

See Audiology and Speech Pathology

University Studies

(Non-Departmental)

University Studies deal with important contemporary topics which are sufficiently comprehensive to require the study and attention of students and faculty from more than one college. They are open to all qualified members of the university community.

4100 Energy Needs and Our Environment (3) Problems of present and projected energy resources and demands; economic, behavioral, legal, technical and environmental opportunities and constraints; regional impacts of energy production and consumption. Topical focus will change from quarter to quarter. MAY not be taken for graduate credit by Ecology majors.

5321 Studies in the Culture of Science and Technology (3) Science and technology as determined by a qualifying examination during the fall quarter of the first year and may repeat the examination the following fall quarter if unsatisfactory scores are received. Competency must be exhibited within this two-year period for a student to continue in the program.

Preparation for thesis or dissertation: During the first year a written examination and a special research problem in each of two faculty members' laboratories will determine the student's preparation for thesis or dissertation study.

College of Liberal Arts

DEGREES

M.S., Ph.D.
THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate’s faculty committee; (2) the comprehensive examination will be oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a B in 3030 language courses. This requirement for the first language must be fulfilled before the student can take the comprehensive examination.

The student’s faculty committee may require of the student any level of training or proficiency in a second foreign language but may not require that the student take the official language examination in the second language.

3050 Comparative Vertebrate Embryology (5) Developmental morphology of selected vertebrates. 2 hrs and 3 labs. F, Sp

3060 Comparative Vertebrate Anatomy (5) Physiology and anatomy of organ systems. Dogfish, shark and cat primarily used in laboratory. 3 hrs and 2 labs. W


3110 General Entomology (5) Introduction to insects; basic structure, development, behavior; classification of insect orders and representative families; interpretation and use of keys. Prereq: Biology 3130 or consent of instructor. 3 hrs and 2 labs. F

3150 Invertebrate Zoology (5) Biology of invertebrates (except insects) with emphasis on ecology and behavior. Prereq: Biology 3120. 3 hrs and 2 labs. W

3220 Physiology of Reproduction (3) (Same as Animal Science 3220). F, Sp

3320 Histology (4) Study of animal tissues. Prereq: Biology 3120. 2 hrs and 2 labs. F, Sp

3410 Bioethics (3) Relationship between biological discoveries and human values. Open discussion of sensitive topics and area for responsible discussion and education. Prereq: 3080 and consent of instructor. 3 hrs. F

4077, 4078-4079 Minicourse in Zoology (2 hrs each) Selected advanced topics in zoology, concentrated in time and subject matter. Consult department listing for actual topics offered. Prereq: As posted. May be repeated. E

4050 Developmental Biology (4) Experimental morphogenesis, fertilization, cellular interactions, hormonal effects and related topics with examples drawn from invertebrates and vertebrates. Prereq: 3050. 2 hrs and 2 labs. W

4120 Graduate Research Participation (2) Experience in active research projects under supervision of staff members. Prereq: Consent of instructor. E

4140 Practicum in Zoology (1-3) Participation in practical application of zoology in community institutions, government organizations and industry. Approximate 5 hrs per week. Prereq: Biology 3110, 3120, 3130 and senior standing. F, W

4190 Mammalogy (4) Classification, evolution, distribution, reproduction, populations, and behavior. 2 hrs and 2 labs or field periods. F

4200 Ichthyology (5) Classification, collection and identification, distribution, life histories, and economic importance of fishes. Prereq: Biology 2100 or consent of instructor. 2 hrs and 5 labs or field periods. F

4210 Cell Physiology (5) Development of modern concepts in cell physiology from point of view of inorganic and organic chemistry; energy, cytoskeletal forces, integration of cellular activities. Prereq: Cell biology, or any physiology, and organic chemistry. Recommended prerequisite for 4210 is a 3- or 4-credit lab. Prereq: 3110.

4240 Animal Ecology (4) Environmental factors determine distribution and numbers of animals; intraspecific and interspecific relations; problems and methods. Prereq: Biology 3120-30 and 2 yrs chemistry. W

4250 Comparative Animal Physiology I (3) Environmental physiology. Survey of physiological mechanisms and their relation to ability of animals to survive in diverse physical environments. Prereq: Biology 3120-30 and 2 yrs chemistry. W

4259 Comparative Animal Physiology Laboratory I (1) Coreq: 4250. W

4260 Comparative Animal Physiology II (3) Sensory, effector and integrative physiology. Prereq: 3080. Sp

4269 Comparative Animal Physiology Laboratory II (1) Prereq: 3080 and consent of instructor. Coreq: 4260. Sp

4270 Immunology (3) (Same as Microbiology 4270.)

4280 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates and invertebrates. Their role and function in maintenance of the organism and species. Prereq: 3080 or equivalent. W

4290 Herpetology (4) Classification, distribution, life histories, collection and identification of amphibians and reptiles, primarily of local species. 2 hrs and 2 labs or field periods. Sp

4300 Ornithology (4) Morphology, physiology, behavior, reproduction, populations, evolution, field identification. 2 hrs and 2 labs or field periods.

4320 Microtechnique (4) Prereq: 3320 recommended. 2 hrs and 2 labs.

4330 General Cytology (4) Study of cellular organization, histology, nucleo-cytoplasmic organization, and the functioning of these organelles. Prereq: Biology 3120. Sp

4360 General Genetic Laboratory (2) Mainly Droso- philia experiments designed to illustrate basic principles of inheritance. Prereq: Biology 3110. W

4380 Organic Evolution (3) Modern concepts of animal evolution. Prereq: Biology 3110. F

4390 Human Genetics (3) Principles and problems of inheritance in humans. Prereq: Biology 2110. F

4410 General Parasitology (4) Morphology, anatomy and ecology of parasitic worms and protozoa, with emphasis on host-parasite relationships. 3 hrs and 1 lab. Prereq: Biology 3130 or consent of instructor. F

4430 Medical Entomology (4) Distinctive morphological features, distribution, life histories, and control of arthropods that parasitize human or serve as vectors of human pathogens. Recommended prerequisite: Entomology and Plant Pathology 3120 or Biology 3130.

4450 Protozoology (4) Morphology, taxonomy, and physiology of protozoa in relation to fundamental biological concepts. 2 hrs and 2 labs. Recommended prerequisite: Biology 3120.

4660 Introduction to Aquatic Ecology (4) Physiochemical nature of inland waters. Biotic communities are described, interrelationships explored. Prereq: Chemistry 1120-30, Biology 3130. 2 hrs and 2 labs. F
tion of counting parameters for single and double isotope counting, quenching and correction, measurement of Cerenkov radiation, procedures for measuring blood volume, solute uptake into cells, radioimmunoassay of steroid hormones, hormone synthesis, synthesis of metabolic intermediates and other topics. Coreq: 5380. Prereq: Graduate standing and one upper division laboratory course in either biochemistry, physiology, microbiology or consent of instructor. Chemistry 3810 highly recommended. F

5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor. W

5430 Advanced Medical Entomology (3) Prereq: 4430.

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

5550 Advanced Ornithology (4) Classification, distribution, and anatomy of birds. Prereq: 4300.

5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5610-20 Foundations of Radiation Biology (4, 4) Physical, chemical, and biological mechanisms involved in actions of different kinds of radiations on living cell and its components. Recommended prereq: 1 yr biological science, general physics, biochemistry; calculus. (Same as Radiation Biology 5610-20.) 3 hrs and 1 lab.

5630 Methods of Experimentation with Laboratory Mammals (3) Designed to give competence in handling research mammals. Techniques of anesthesia, drug administration, radiography and surgery. Prereq: 4050, or 4410, or consent of instructor.

5660 Physiology of Development (3) Chemical aspects of growth, morphogenesis, and cytodifferentiation. Recommended prereq: Biochemistry 4110-20. F

5670 Cellular Immunology (4) Laboratory course with emphasis on immunological phenomena at cellular level. Preparation and use of immunofluorescent reagents, macrophage migration inhibition, skin allograft reactions, diffusion chamber cultures, and antibody formation at cellular level. 4 hrs and 2 labs.

5740 Physiological Ecology of Animals (2) Adaptive physiological responses of animals to natural changes in or extremes of physical and biotic environment. Emphasis on terrestrial vertebrates. Term paper including review of assigned topic with emphasis on creative development of special aspect. 1 2-hr lec. Su

5760 General Vertebrate Neuroanatomy (3) (Same as Psychology 5760.)

5780 Radiation Physiology (4) Effects of different kinds of radiations on functions of cells, tissues, and organ systems of animals. Recommended prereq: 5610. (Same as Radiation Biology 5780.)

5790 Transport of Ions Across Epithelia (4) Operational principles and methods needed to study electrical and kinetic properties of epithelia and electrically excitable tissues. Quantitative methods of measuring ion fluxes and flux ratios. Prereq: Two upper-division physiology courses, graduate standing, or consent of instructor. Recommended prereq: Chemistry 3810.

5820 Methods of Taxonomy (4) Classification of animals; rules of nomenclature; problems in priority; preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W

5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp

5860 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.

5870 Insect Synecology (4) Ecology of insect communities.

6000 Doctoral Research and Dissertation (3-15) E

6110 Seminar in Cellular Biology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6140 Seminar in Immunobiology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6210 Seminar in Physiology (2) Prereq: Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) Prereq: 4310. May be repeated. Maximum 6 hrs. W


6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

6510 Seminar in Genetics (2) Prereq: General genetics. May be repeated. Maximum 6 hrs. F

6610 Seminar in Ornithology (2) Prereq: 4300. May be repeated. Maximum 6 hrs.

6650 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, 4660-70, Botany 5061, or consent of instructor. May be repeated. Maximum 6 hrs. F; W, Sp

6710 Seminar in Ecology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6910 Seminar in Radiation Biology (3) Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
The major campus of the College of Medicine is located in Memphis, Tennessee. The College, however, is a statewide organization with other units in Chattanooga, Jackson, and Knoxville.

In addition to Department of Medical Biology faculty listed here, the Knoxville Unit has other College of Medicine faculty and students in undergraduate and graduate medical education.

The College of Medicine traces its origin to the establishment of the Medical Department of the University of Nashville in 1851. Later, through a merger of four medical schools, it became The University of Tennessee College of Medicine and moved to Memphis in 1911.

Department of Medical Biology/Memorial Research Center

Professors:
- R. D. Lange (Chairperson and Director), M.D., Washington; C. C. Congdon (Vice Chairperson and Associate Director), M.D., Michigan; W. R. Farkas, Ph.D., Duke; S. Krauss, M.D., Pennsylvania; B. B. Lozzio, M.D., Buenos Aires (Argentina); C. B. Lozzio, M.D., Buenos Aires (Argentina); T. P. McDonald, Ph.D., Tennessee; A. Solomon, M.D., Duke; P. W. Wigler, Ph.D., California (Berkeley).

Associate Professors:

Assistant Professors:
- E. W. Fussor, Ph.D., Tennessee; W. T. Hanna, M.D., Ain-Shams (Egypt); A. T. Ichiki, Ph.D., California (Los Angeles); K. D. Lin, M.D., National Taiwan (Taiwan); F. J. Miller, A.B., Alabama.

The Department of Medical Biology of The University of Tennessee College of Medicine-Knoxville Unit was formed from the faculty of The University of Tennessee Memorial Research Center and Hospital in 1978. The Research Center was established in 1956. Its faculty has education, research, and service interests in cancer, blood diseases, birth defects and clinical genetics, and biochemistry of disease. Courses in these areas are offered to students at the graduate and undergraduate levels. Elective courses are also available to students in the College of Medicine by special arrangement.

The faculty with the College of Veterinary Medicine participates in the graduate program leading to M.S. and Ph.D. degrees in Comparative and Experimental Medicine. Other advanced degree students can do thesis research in the department by arrangement with other life science departments at the University.

Courses

4210 Introduction to the Study of Cancer (3) Lectures, classroom discussion, and case reports surveying the major topics of oncology. Preq: Biology 3110-20 or consent of instructor.

4310 Introduction to Hematology (4) Pathophysiology of blood and blood forming systems. Lectures, class discussions and demonstrations. Preq: Upper division biology background to include histology and/or general anatomy.

4430 Clinical Genetics (3) Human genetic disorders, case presentations. Preq: General biology and general genetics background or consent of instructor.

5000 Thesis (1-15) E

5220 Special Topics in Cancer (1-3) Special topics in oncology. Preq: 4210 and consent of instructor. May be repeated. Maximum 9 hrs.

5320 Special Topics in Hematology (1-3) Special topics in clinical hematology. Preq: 4310 and consent of instructor. May be repeated. Maximum 9 hrs.

Sylvia E. Hart, Dean  
Barbara M. Reid, Associate Dean for Student Affairs  
Dorothy B. Stephens, Assistant Dean for Clinical and Business Affairs

The College of Nursing offers a five-quarter program of study leading to the Master of Science in Nursing degree. The general purpose of the program is to prepare at the graduate level nurses who are qualified to function as practitioners, clinician, educators, and administrators in all segments of the health care delivery system.

Upon successful completion of the program, graduates will be able to:

1. Provide advanced high quality, comprehensive nursing care to individuals and groups in a variety of settings;  
2. Collaborate with other health professionals in systematic implementation and evaluation of health care delivery to large groups in agency and community settings;  
3. Utilize appropriate advanced teaching, administrative and clinical practice skills in the discharge of one's professional responsibilities;  
4. Utilize appropriate research findings in the implementation and evaluation of nursing care;  
5. Participate in clinical research activities by means of data collection, tabulation, and analysis, and by generating research topics for referral to nurse researchers.

GENERAL REQUIREMENTS FOR ADMISSION
1. Meet requirements for admission to The Graduate School.  
2. Hold a Bachelor's degree in Nursing. If the Bachelor's degree is not in Nursing, the applicant must demonstrate successful completion of the equivalent of an upper division major in Nursing.  
3. If the number of qualified applicants exceeds the number that can be accommodated, preference will be given to applicants:
   a. whose undergraduate GPA is 3.0 or higher;  
   b. who have had at least two years of full-time clinical practice experience following completion of a baccalaureate nursing program;  
   c. who are Tennessee residents;  
   d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program; or  
   e. who are currently employed as nurse educators in programs preparing registered nurses; or  
   f. who are currently employed as directors of nursing service.  
4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.

DEGREE REQUIREMENTS
1. Students must complete 60 quarter hours of graduate level course work with a cumulative GPA of 3.0 or better.  
2. The 60 credit hours must include the following components:
   - Core requirement: 23 hrs
   - Clinical concentration option: 20 hrs
   - Functional concentration option: 11 hrs
   - Electives: 6 hrs
   Total: 60 hrs

3. A Master's thesis is not required, but those students who wish to complete a thesis as a part of their program may substitute the thesis for the 6 elective hours.  
4. Those students who do not choose the thesis option must successfully complete a comprehensive final examination.  
5. Students may choose either primary care nursing, secondary/tertiary care nursing or community mental health nursing as their clinical concentration option. Students selecting the primary care nursing option must complete 5450, 5460, 5550. Students selecting the secondary/tertiary care nursing option must complete 5480, 5490, 5510 and 5310. Students selecting the community health nursing option must complete 5410, 5480, 5490, 5500 and 5510.

6. The core requirement that must be completed by all students regardless of clinical option includes the following courses: 5010, 5020, 5030, 5070, 5210, 5680 and a graduate level statistics course that must be approved in advance by the student's faculty advisor.  
7. Students may select a role preparation option in teaching, management or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the management option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the advanced clinical practice option must complete 5560 and 5660 if their clinical option is primary care, 5320 and 5340 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Except for electives, all courses taken in other colleges must be approved in advance by the student's faculty advisor.

REQUIREMENTS FOR SECOND MASTER'S DEGREE
1. Students must complete 60 hours at the graduate level (with a cumulative GPA of 3.0) unless they already have Master's or doctoral degrees. For the latter up to 15 hours may be applied to the second Master's degree, with approval of the student's committee, Dean of the College, Dean for Graduate Studies and/or Vice Chancellor for Graduate Studies and Research.

Any hours so applied would be from courses in the first degree program that are directly relevant to the second. Hours from the first program to be applied to the second shall have been earned within the time limits (six years) established for the second. Reduction of hour requirements, when appropriate, will not be used to reduce the residency requirements of the second Master's degree.

2. The 45 to 60 hours must include the following components:
emphasis on those processes which, when altered, are most commonly encountered in acute and chronic disease states. Prereq: 3210-20 or 4010 or consent of instructor. Su, F, Sp.

5620 Current Health Issues (2) Weekly seminar dealing with current and pending legislative, political, and community issues, concerns, and actions that have direct or indirect implications for nursing and health care. Prereq: consent of instructor. E.

5630 Behavioral Dynamics (3) Interviewing and communication theories utilized in nurse-client interactions and therapeutic intervention; assessment and treatment of psychological, psychiatric, psychosocial, and crisis states. Prereq: 16 hrs in undergraduate or graduate behavioral sciences.

5700 Theories of Nursing (3) History of nursing theory; examination of selected nursing concepts, theories, conceptual frameworks and philosophies and their relationship to nursing education and nursing practice. F.

5703 Independent Study in Nursing (1-4) In-depth exploration of a nursing topic of special interest to the student. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5120 Secondary/Tertiary Nursing of Adults I (6) Role of clinical nurse specialist in assisting adults and their families when interventions of advanced nursing, physiological, developmental and psychosocial theories to delivery of health and nursing care to adults and their families who are experiencing acute illness episodes and related crises. Prereq: 5010; 5030; 5070. 3 hrs and 3 labs.

5130 Secondary/Tertiary Nursing of Adults II (6) Continuation of 5120 with emphasis on role of clinician in assisting children and families; application of advanced nursing, physiological, developmental and psychosocial theories and techniques useful in assisting children and their families who are experiencing acute illness episodes and related crises. Prereq: 5020; 5120. Prereq or coreq: 5210. 3 hrs and 3 labs.

5140 Secondary/Tertiary Nursing of Children I (6) Exploration of role of pediatric clinical nurse specialist in assisting children and their families to optimal health; application of advanced nursing, physiological, developmental and psychosocial theories and techniques useful in assisting children and their families who are experiencing acute illness episodes and related crises. Prereq: 5010; 5030; 5070. 3 hrs and 3 labs.

5150 Secondary/Tertiary Nursing of Children II (6) Continuation of 5140 with emphasis on role of pediatric clinical nurse specialist in assisting children and their families during community health assessment and in client-staff education programs; exploration and utilization of community health resources, and therapeutic techniques in assisting children and their families; application of advanced nursing theories and concepts to care of chronically or terminally ill children in variety of settings. Prereq: 5020; 5140. Prereq or coreq: 5210. 3 hrs and 3 labs.

5170 Readings in Applied Physiology (3) Carefully planned library study of selected topics in physiology and pathophysiology related to various body systems. Prereq: 5010. E.

5210 Applied Nursing Research (4) Utilization of research process to identify and investigate common health problems. Prereq: 4440 or equivalent, graduate level statistics course. W, Sp.

5310 Secondary/Tertiary Care Nursing Field Work I (6-8) Guided practical experience in a community health setting with opportunities to apply newly acquired nursing knowledge to more complex clinical problems. Prereq: 5120-30-50. 6-8 hrs.

5320 Secondary/Tertiary Care Nursing Field Work II (9) Continuation of 5310 with emphasis on further acquisition and refinement of nursing skills needed to provide nursing care to acutely ill patients. Prereq: 5310. F.

5340 Secondary/Tertiary Nursing Seminar (2) Identification of issues and problems involved in delivery of secondary/tertiary nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect role of nurse as secondary/tertiary clinical specialist. Coreq: 5320. Prereq: 5680. F.

5410 Principles of Community Mental Health (3) Exploration of the historical and theoretical bases of community mental health care; discussion of nursing and other mental health care provider roles within current mental health care delivery systems.

5540 Community Mental Health Nursing Seminar (2) Identification of issues and problems involved in delivery of community mental health care; further analysis and exploration of theories and concepts included in 5680 as they affect the role of nurse as community mental health clinical specialist. Coreq: 5520. Prereq: 5680. F.

5460 Family Centered Primary Care Nursing II (6) Primary care nursing and health care management of individuals and families in middle and later life stages of development; application of the nursing process to management of selected episodic and chronic health problems. Prereq: 5020, 5450. Prereq or coreq: 5210. 4 hrs and 2 labs.

5480 Community Mental Health Nursing: Individual (3) Application of nursing process within systems framework; therapeutic intervention with individuals; exploration of individual and group theories of psychosocial families; analysis of special clinical problems. Prereq: 5010, 5030, 5070; 2 hrs and 1 lab. W.

5490 Community Mental Health Nursing: Family (3) Application of utilization of communication and systems theories in therapeutic work with families experiencing mental health problems; current models of parenting education. Prereq: 5020, 5480. Prereq or coreq: 5210. 2 hrs and 1 lab.

5500 Community Mental Health Nursing: Group (3) Study of group leadership and group dynamics. Prereq: utilization of communication and systems theories in therapeutic work with families experiencing mental health problems; current models of parenting education. Prereq: 5010, 5480. 2 hrs and 1 lab.

5510 Community Mental Health Nursing Field Work I (6) Clinical practicum in a community setting providing opportunities to apply mental health nursing knowledge in planned interactions with individuals and groups at primary, secondary and tertiary care levels. Community and mental health systems assessment. Prereq: 5440 and 5470. Su.

5520 Community Mental Health Nursing Field Work II (9) Clinical practicum for graduate students in psychopathological nursing and role in psychoanalytic and psychosocial process. Objectives identified by student to meet specific learning and practice needs. Prereq: 5510 and 5520. 6 hrs.

5540 Community Mental Health Nursing Seminar (2) Identification of issues and problems involved in delivery of community mental health nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect the role of nurse as community mental health clinical specialist. Coreq: 5520. Prereq: 5680. F.

5550 Primary Care Nursing Field Work I (8) Placement in selected off-campus primary care delivery sites for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as primary care practitioner. Prereq: 5460. Coreq: 5680. Su.

5560 Primary Care Nursing Field Work II (9) Continuation of 5550 with further emphasis on acquisition and refinement of primary care skills. Prereq: 5460. Coreq: 5680.

5630 Teaching Strategies and Practicum (5) Analysis and application of curricular and teaching methodologies; field placement with supervised opportunities to provide clinical instruction to undergraduate nursing students. Prereq: 6 hrs approved education courses or consent of instructor. 2 hrs and 3 labs.

5660 Primary Care Nursing Seminar (2) Issues and problems involved in delivery of primary care nursing; further analysis and exploration of theories and
concepts included in 5680 as they affect role of nurse as primary care provider. Coreq: 5560. Prereq: 5680. F

5680 Advanced Nursing Seminar (3) Theories of leadership, motivation, power, conflict, authority, change and decision making and their application to advanced clinical nursing practice; examination and analysis of role of nurse as health care provider and client—family advocate. Prereq or coreq: 5310 or 5550 or 5510. Su

5730 Management Strategies and Practicum (5) Analysis and application of managerial and supervisory theories and strategies; field placement in nursing service facility with supervised practice in nursing service administration. Prereq: 6 hrs approved management courses or consent of instructor. 2 hrs and 3 labs. Sp

5770 Special Topics (3) In-depth study of selected nursing topics, problems, or issues not covered in other courses. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
School of Architecture

Roy F. Knight, Dean
William J. Lauer, Associate Dean

Professors:

Associate Professors:
J. Burin, M.Arch. Academy of Fine Arts (Prague); A. Derman, Ph.D. Pennsylvania State; R. M. Kalo, M.S. Tennessee; W. E. Martella, B.Arch. California (Berkeley); M. S. Mofret, Ph.D. Massachusetts Institute of Technology; R. T. Quinn, Ph.D. Lehigh.

Assistant Professors:

Lecturers:
A. G. Anderson, M.A. Missouri; M. C. Martin.

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

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

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

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

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

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


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


4738 Aesthetics of Engineering Structures (4) Architecture in engineering; theory and utilization of space, design, and materials in large structures. Bridges, exhibition halls, power plants.

4850 Elementary Structural Matrix Methods (4) Introduction to generalized matrix methods of analysis of structures. Review of matrix algebra and vectors; development of member stiffness and flexibility matrices; assembly of structure stiffness and flexibility matrices. Prereq: Consent of instructor. (Same as Civil Engineering 4850 and Engineering Science and Mechanics 4850.) Su

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

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


4950 Environment as Code (4) Advanced lecture of graduate students and upper division students. Advanced lecture course of theoretical issues involved in considering environment as a medium of human communication. Codes and nature of coding behavior in animals and humans. Relationship between coding behavior and the organization of the central nervous system. Coding and social behavior. Communication process as a generic model of human environment relations. Hierarchical aspects of environmental communications. Prereq: 2000 or consent of instructor.
Graduate School of Biomedical Sciences

W. E. Barnett, Director
R. J. Preston, Associate Director

MAJOR DEGREES
Biomedical Sciences M.S., Ph.D.

The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, located within the Biology Division of Oak Ridge National Laboratory, offers programs leading to the Master of Science and Doctor of Philosophy degrees. The National Laboratory, one of three installations operated at Oak Ridge by Union Carbide Corporation for the Department of Energy, is a well-known center of basic research. The school utilizes the staff and facilities of this laboratory, and thus brings directly into the mainstream of full-time graduate study in the life sciences the talent and experience of that staff, as well as the most advanced research methods and technology.

The program of study, which incorporates a high faculty-to-student ratio, is based on intensive graduate courses supplemented by tutorial instruction, participation in a wide variety of seminars, and a heavy emphasis on communication skills, research training and independent study. The program encourages students to pursue graduate studies to the limits of their abilities.

The School is not departmentalized, and, apart from certain basic requirements, each student's curriculum is planned to meet individual needs, with the aim of giving: (1) strength in the biomedical sciences as a whole; and (2) perception of the basic sciences. The program encourages research training and independent study. The program encourages students to pursue graduate studies to the limits of their abilities.

The research areas available for Master's thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, cellular, developmental and mammalian biology, and radiation biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, and problems of aging.

ADMISSION REQUIREMENTS
A Bachelor's degree or its equivalent is required. Students with M.S., D.V.M., or M.D. degrees are also encouraged to apply. Completed applications, Graduate Record Examination scores and letters of reference should be sent to the address below. The student will need previous training in biology, calculus, physics, and organic and physical chemistry. However, a course in physical chemistry is offered by the School in order to meet this requirement. It is recommended that deficiencies in meeting entrance requirements should be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to:
Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM
Requirements for the Ph.D. degree are:
1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology I (5180); Cell Biology II (5190); and Statistics for Biologists (5740).
2. Three quarters of Biomedical Sciences Laboratory (5310-20-30-40).
3. Participation in at least one of the seminars during each quarter of residence after the first year is strongly recommended.
4. Satisfactory completion of formal advanced courses in the areas of the student's interests. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.
5. Pass both written and oral comprehensive examinations.
6. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course 6000 is required.
7. A final oral examination on the dissertation.
8. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM
The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and as space is available.

Requirements for the M.S. degree are:
1. Graduate credit or a proficiency in the following core courses: Biochemistry (5110-20); Cell Biology I (5180); Cell Biology II (5190); plus any three of the following four courses: Biophysics (5140); Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.
2. Forty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of credit for course 6000). Additional hours of credit may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.
3. For admission to candidacy:
   1. Completion of any required prerequisite courses and one quarter of graduate coursework with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.
   2. A Master's Committee of three approved faculty members upon admission to candidacy.
   3. A thesis reporting results of original and significant scientific research.
   4. Pass a final oral (or oral and written) examination as determined by the student's committee.
5140 Biophysics (3) Energy levels and excited states of atoms and molecules; quantum mechanical methods; methods of approximation and adaptations to system perturbations; properties of macromolecules in solutions; molecular conformations; interactions between biomolecules; physical principles of microscopy. Prereq: 5070-80.

5150 General Genetics (3) Mendelian genetics, mitosis, and meiosis. Transmission genetics, mapping, and linkage.


5170 Molecular Genetics (3) Molecular biology of genetic processes. Gene regulation; coding; protein synthesis; suppression of nonsense mutations; mutagen mechanisms; complementation; recombination. Prereq: 5110-20, 5160.

5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of eukaryotic cells. Pertinent instruments and techniques; techniques and mechanisms; cell cycle; chromosome structure; nuclear RNA metabolism; nucleol; ribosomes; cellular organelles; survey of specialized systems. Cell cycle. Prereq: 5110, 5180. Coreq: 5120.

5190 Cell Biology II (3) Comparative biochemical approach to cell structure and function. Membrane systems and metabolism; development and fundamental importance of mitochondria, chloroplasts, peroxisomes and other organelles as related to metabolism and regulation; transport; phenomena; cell cycle. Prereq: 5110, 5180. Coreq: 5120.

5200 Mammalian Physiology (4) Mammalian organ systems and their functions. Nervous, muscular, endocrine, digestive, respiratory, circulatory, reproductive, and excretory systems. Interrelationships of these systems and fundamental importance of interactions in contemporary biological research. Prereq: 5110.

5230 Biochemical Concepts In Medical Sciences (3) Biochemical mechanisms involved in physiological and pathological processes of human body. Dynamic functions of org system; biochemical pharmacology; hormone actions; neurobiochemistry. Current biochemical advances in basic and clinical medicine. Prereq: 5200, 5110-20.

5310 20-30-40 Biomedical Sciences Laboratory (3, 3, 3) To acquaint students with both approaches and technologies in various areas of biomedical research. Individually or in groups of three or four laboratories conducting research in different areas of biomedical science. Required of all first-year students.

5350-60 Biomedical Sciences Seminar (1, 1) Critical analyses of current journal publications in selected area of modern biology. Written evaluation of papers and weekly oral presentations by each student. Required. Prereq: 5110-20 or consent of instructor.

5370 Biomedical Sciences Seminar (1) Basic principles of scientific writing. Research articles, grant and thesis proposals, abstracts, review articles, progress reports. Required of all first-year students.

5430-60-90 Graduate Research Participation (3, 6, 9) Special advanced research project covering area not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

5510-20-30-40 Special Topics in Biomedical Sciences (3, 3, 3) Tutorials or formal lectures. Participation topics include x-ray diffraction and crystallography; excited-state biophysics; physical chemistry of macromolecules; pathophysiology; cytoplasm and genetecnic; mammalian genetics; human genetics; cancer research; plant physiology; radiation biology; aging research. Additional courses developed on any subject of mutual interest to individual students and staff members. May be repeated.


5740 Statistics for Biologists (3) Application and interpretation of statistical methods in data analysis. Random variational models, normal and Poisson distributions, statistical presentation of data, estimating means and variance; confidence intervals; tests of significance for comparing samples; analysis of variance; contingency tables; chi-square tests; correlation and association; linear regression. Prereq: Introductory statistics or consent of instructor.

5840 Bioorganic Reaction Mechanisms (3) Nature of chemical bonds and electronic reactions, molecular rearrangements, oxidation-reduction, solvolysis, protein and nucleic acid modification, peptides, enzymes, protein and nucleic acids on polymer supports.

5860 Cryobiology (3) Physical and chemical responses of cells and bacteriophage to low temperatures and ice formation. Relation of these responses to permeability, structure of semipermeable membranes, formation of macromolecules, and nature and state of water in cells; and how they bear on other fields of biology and medicine—including electron microscopy, photobiology, cell physiology, biochemistry, and cryosurgery. Prereq: 5070-80 or equivalent, and 5190.

5940 Classic Experiments in Genetics (3) Original papers presenting new and lasting concepts in genetics. Prereq: 5170.

6000 Doctoral Research and Dissertation (3-15)


6230 Enzyme Regulation and Kinetics (3) Kinetics of catalysis; Inhibition by product, substrate and deadend inhibitors; stimulation and inhibition of Michaelis-Menten kinetics; feedback regulation; role of substrate in enzyme regulation; multifunctional enzymes. Prereq: 5110-20.

6240 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes. Enzyme expression, and nutritional aspects. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Prereq: 5110-20.

6251 Molecular Biology in RNA (3) RNA synthesis and metabolism in prokaryotic and eukaryotic cells and their viruses. Prereq: 5110-20 or consent of instructor.

6252 Molecular Biology of DNA (3) DNA replication, repair, and recombination. Recent advances in mechanisms at all levels of genetic expression and general and synthetic techniques. Prereq: 5150-20 or consent of instructor.

6270 Viral Carcinogenesis (3) History of viral oncology and cancer viruses, etiology of tumor viruses. Biology of normal and transformed cells. DNA tumor viruses; replication cycle; transformation; genetics; natural history. RNA tumor viruses; endogenous and exogenous states; genetics; induction; transformation; natural history.

6280 Chemical and Physical Carcinogenesis (3) History and epidemiology of considerations of nature and metabolism of chemical carcinogens; radiation and site-specific carcinogenesis.
6290 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymology, metabolism; membranes; DNA repair; regulation; strategies in chemotherapy.

6300 Mutagenesis (3) Basic mechanisms in chemical and radiation mutagenesis and dosimetry in variety of systems including bacteria, fungi, Drosophila, and mice.

6400 Membrane Biology (3) Transport kinetics, membrane biogenesis and turnover, endocytosis and exocytosis, receptor regulation, hormone-membrane biogenesis interactions. Prereq: 5110-20 and 5180-90 or consent of instructor.

6410 Techniques in Cell Biology (3) Application to specific research problems, kind of data they yield, and cautions in data interpretation. Laboratory demonstrations may be arranged where appropriate. Prereq: 5180-90 or consent of instructor.

6450 Immunology (3) Structured lectures in modern immunology and emphasis on concepts and mechanisms at the cellular level. Topics: T-B cell interaction, soluble mediators, tolerance, surveillance, transportation genetics, immunoglobulin structure. Selected laboratory exercises. Prereq: 5180-90 or consent of instructor.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Current and future research developments. Topics listed under Special Topics Courses, can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.

6600 Mammalian Genetics (3) Orderly presentation of known genetics variants affecting each organ system of experimental mammals, especially laboratory mouse. Prereq: 5160.

6610 Mammalian Biochemical Genetics (3) Combined biochemical and genetic approaches to problems of immunology, globin synthesis, and control of enzyme synthesis. Prereq: 5110-20 and 5160 or consent of instructor.

6650 Microbial Genetics (3) Basic phenomena in microbial genetics: transduction, transformation, conjugation, and mutation. Genetics of bacteriophage. Prereq: 5160 or consent of instructor.

6750 Regulation of Intermediary Metabolism (3) Pathways involved in intermediary metabolism. Steady-state processes, "nonequilibrium" reactions, first enzymes, feedback inhibition, isozymes, multienzyme systems and compartmentation, covalent modification, positive and negative control, catabolite repression, autoregulation, stringent control, attenuation, hormonal control, other selected topics. Prereq: 5110-20 or consent of instructor.
The Graduate School of Library and Information Science provides a program leading to the preparation of librarians and information scientists for work in all types of libraries and information centers. The program of study includes a graduate curriculum leading to the degree of Master of Science in Library Science.

MASTER OF SCIENCE IN LIBRARY SCIENCE

The goal of the program is to prepare graduates to function effectively in libraries and information centers. The program is designed to:

1. Enable students to examine critically the role and function of libraries and information centers in our society, and to define and redefine that role as the needs of society demand;
2. Enable students to understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Enable students to understand and apply the principles of management to the library and information centers;
4. Enable students to assume individual and collective responsibility for the well-being and development of their profession and of professional service.

PROGRAMS OF INSTRUCTION

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 24 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 9 hours allowed for thesis credit. At least 36 hours must be taken in the Graduate School of Library and Information Science, allowing up to 15 hours outside the School. Upon completion of the program, all students are subject to an examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination. Programs are designed for persons interested in school libraries, public libraries, academic libraries, special libraries and information centers as well as a variety of library and information related activities.

The SREB Academic Common Market applies to applicants from Arkansas, Georgia, West Virginia, and Virginia.

ADMISSION REQUIREMENTS

The minimum grade point average for admission to The Graduate School is 2.5. Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the aptitude test of the Graduate Record Examination. The test should be taken at least one quarter in advance of application for admission to The Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language.

APPLICATION PROCEDURE

Admission to the program in The Graduate School of Library and Information Science should be made in advance of the quarter for which admission is requested. Applicants should submit the "Application for Admission" form (printed as the first page of The Graduate School Catalog) and should request the registrars of all colleges and universities attended to send two official transcripts to The Graduate School. In addition, each applicant should make arrangements to take the GRE and TOEFL exams, if applicable. A personal data sheet and three recommendations (obtained from The Graduate School of Library and Information Science) should be returned to the Director of the School.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment opportunities with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus extend the period required for the degree up to two years.

Similar opportunities exist with some other libraries and information agencies in the Knoxville area.

A limited number of graduate assistantships are available through the School for the degree. Assistantships of this type carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in the School.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

Faculty

Professors:

Associate Professors:

Assistant Professors:
- J. M. Pemberton, Ph. D. Tennessee; M. S. Stephenson, M. L. S. North Texas State.

Courses

4140 Libraries and Librarianship (3) Librarianship as an occupation: its organization, responsibilities, problems and prospects.

4150 School Library Administration (3) Objectives, functions, and place of school library; relationships to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.)

4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections.
5350 School Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group. Prereq: 4150 or consent of instructor.

5360 Special Libraries and Information Centers (3) Development and present status, scope and objectives, administration and organizational problems, acquisition, organization, and use of information.

5370 The Library in the Community (3) Public library as social agency; role in education and communication systems of community.

5380 Seminar in Library and Information Science (3) Advanced study of varying topics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5400 Library Facilities (3) Problems inherent in planning and construction of library quarters. Interrelationship of staff, materials, and user space requirements.


5510 Nonbook Resources (3) Selection, processing, storage and utilization; films, video technology, sound recordings and microforms as information media. Prereq: 5500 or consent of instructor.

5515 Serials (3) Serials collections: selection, acquisition, bibliographic control, process, storage, maintenance, and public service. Prereq: 5500 or consent of instructor.

5520 History of the Book (3) History of writing and various methods of bookmaking from earliest times through 19th century. Prereq: Consent of instructor.

5530 Contemporary Publishing (3) Creation, production, marketing, and distribution of materials acquired by libraries, with special attention to various types of publishers.

5540 Archives and Manuscripts (3) Problems involved in acquisition, organization, description, storage, preservation and utilization. Prereq: Consent of instructor.

5550 Records Management for Information Professionals (3) Functional elements and objectives of records management within organizations, emphasizing records control of creation, distribution, retention, storage, retrieval, protection, and disposition regardless of medium. Prereq: 4330, 4270, or consent of instructor.

5600 Reading Guidance for Children and Young People (3) Organization to meet needs, interests, abilities of different age and socioeconomic groups. Prereq: 5640 or consent of instructor.

5610 Mass Communications and the Library (3) Mass media of communication in terms of their relation to modern library service, considered as forces that influence what people read, see, and hear.

5620 Traditional Literature and Oral Narration (3) Fundamental principles of art storytelling; techniques of adaptation and presentation for various age groups; instruction and practice in oral techniques.

5630 Critical History of Children's Literature I (3) Development of literature for children noting influence of changing social and cultural factors; attention to emergent genres through primary sources. Fifteenth century to 1920.

5640 Critical History of Children's Literature II (3) Development of literature for children noting influence of changing social and cultural factors; attention to emergent genres through primary sources. 1920 to present.

5661 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 5661.)

5700 Automation of Library Processes (3) Computer concepts and operations; applications to basic library operations: acquisitions, catalogs, circulation, and serials. Coreq: 4270, 5500, or consent of instructor.

5710 Introduction to Information Science (3) Content and method of information science; application of research findings to general library practice.

5720 Information Systems Analysis and Design (3) Examination and evaluation of tools and methodologies in library/information center systems planning and implementation. Role and training of systems analysts; systems study from planning through implementation and evaluation, and related topics. Prereq: 5710.

5725 Organization of Materials for Information Storage and Retrieval (3) Principles and techniques in organization and description of materials for input to information storage and retrieval systems: indexing, abstracting, document representation, thesaurus construction and maintenance, related topics. Prereq: 5710 or consent of instructor.

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing performance of systems to arrive at generalizations with respect to theory, design and operation of information retrieval systems.

5750 Information Technologies (3) Computer-based and non-computer-related media and methods for information storage, retrieval, and transfer within and external to library environment; existing and prototype hardware and software and interfacing of these technologies. Prereq: 5700 or consent of instructor.

5999 Practicum (6 or 9 or 12) Opportunity to translate library theory into practice under guidance of qualified librarians. Prereq: Completion of 21-hr core curriculum plus approval of director.
The purpose of study is the education of professional planners, competent to handle positions of increasing technical and administrative responsibility. Graduates are candidates for professional service in regional, city, county, and metropolitan area planning agencies; in local, state, and federal agencies concerned with physical, economic and administrative planning; in private businesses and organizations dealing with urban problems; and in private consulting practices.

The curriculum is organized on a basis of six quarters, or 72 credit hours, and provides the student with core courses in planning theory, methods and techniques, and also takes advantage of offerings at The University of Tennessee in related fields such as government, economics, geography, civil engineering, and sociology. The course of study ordinarily requires two years with an optional work internship during the summer between the two years. Planning courses as well as related courses will be offered during the summer period. This is to serve the needs of those planners now in the field who wish to acquire their professional degree but who can spare only the minimum amount of time from their jobs because of financial or family considerations.

Entering students follow a program of courses which provides education in the basic elements of planning. These include studies in theory, history, analytical methods, and legislation, as well as related courses in government, geography, sociology, and economics. Students are permitted to pursue particular interests through the choice of electives approved by the Graduate School of Planning. Practice in research and analysis on a particular planning problem or topic is obtained through the preparation of a thesis or major study option.

Core planning courses are taught by the faculty of the Graduate School of Planning. Related courses are taught by other specialists drawn from the University faculty. In addition, the services of experienced professional planners in TVA and other public and private organizations are called upon to broaden the scope of the students' understanding. A variety of outside speakers and seminar leaders provide insight into particular problems of significance to planners.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Both letters should be from teachers familiar with the applicant's undergraduate or, where applicable, graduate academic record. In the event the applicant has had planning experience, a third letter is required from a supervisor or other person familiar with the planning work of the applicant. All applicants who wish to be considered for financial assistance from the University or the Graduate School of Planning should also submit recent Graduate Record Examination scores for the Aptitude (verbal, quantitative and analytical) portion of that test. All applicants are also requested to submit a statement of career goals.

The M.S.P. degree is approved for SREB Academic Common Market participation in Arkansas, Georgia, Kentucky, and West Virginia.

All inquiries concerning admission should be addressed to: Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37916.

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit. The following courses are the required core curriculum for the M.S.P. degree: 5040, 5045, 5100, 5110, 5130, 5180, 5230, 5270, 5280, 5340, 5435, 5440, 5468, 5500, Sociology 5320 or Statistics 5211. Waivers can be made by the faculty where competence is demonstrated.

Each student will be required to demonstrate competence in individual research. This may take either of two forms.

Plan I—Complete a thesis for 9 hours credit.

Plan II—Complete a major study with acceptable documentation. In order to be eligible for the major study the student must have earned a grade of B+ or higher in Research Methods II, have a 3.5 cumulative grade point at the time of approval of the major study proposal, and have completed at least 24 hours of graduate study. The student meeting these criteria may present a proposal for a major study which will include at least 9 hours of elective course work in an area of concentration. The proposal shall justify the area of study, the approach to the study, and the method of final documentation. Approval of the documentation, which must include written documentation, is a prerequisite for graduation.

Students in the Graduate School of Planning are given a comprehensive written examination after approximately four quarters of course work. In addition to testing the knowledge of the student, the information thus obtained is taken into account in advising students concerning the study program they should undertake during the balance of their academic program to remove any indicated deficiencies.

Each student will be encouraged, but not required, to complete a work internship equivalent to at least two and one-half months of full-time work in a planning agency at approximately the mid-point in course work.

Faculty

Professors:

Associate Professor:
G. E. Bowen, M.A. George Washington.

Assistant Professors:
P. Fisher, Ph.D. Florida State; A. Loebi, Ph.D. Missouri.
Courses

4100 Survey of Planning (3) History of city development and of planning with special attention to the U.S. experience in urban and other levels of planning. State of the art, the comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree. F

5000 Thesis (1-15) E

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

5005 The Planning Process (3) Identification and examination of relevant aspects of planning process and planning techniques applied in variety of settings. Not for credit for M.S.P. degree. F, Su

5040 Communications for Planners I (1) Introduction to basic communications, interpersonal and oral communications, graphic presentations, audiovisual equipment. F, Su

5045 Communications for Planners II (1) Graphic communications in planning. Maps and mapping, computer graphics, models and presentation graphics. Prereq: 5040. W

5050 Communication for Planners III (1) Audiovisual equipment, programmed communications, and photography used in planning. Prereq: 5045. Sp

5100 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 5110. W

5110 Introduction to Planning (3) History of planning, familiarization with operations of contemporary planning, concept of systems, current trends and issues. Relationship between planning and society in which it occurs. Designed for GSP students. F, Su

5130 Planning Research Methods I (2) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basic for planning and decision-making. F, Su

5135 Planning Research Methods II (3) Application of rigorous investigation techniques in solving planning problems, including statistical analysis and mathematical models. Urban and regional information systems as resource and tool in problem identification and solution. Prereq: 5130. W, Sp

5145 Library Research for Planning (1) Survey of publications of interest to planners, including resources and research techniques. Use of facilities and collections of UTK library. F, W

5160 Planning and Utilities (3) (Same as Environmental Engineering 5160.)

5170 Planning for Historic Preservation (3) Plan- ning for preservation, restoration and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local government role in preservation, designation of sites, legislative needs, financing and administrative organizations.

5180 Planning Analysis and Forecasting (3) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment and economic base studies with emphasis on forecasting techniques. Prereq: 5130. W

5230 Urban and Site Design (3) Principles of design of residential subdivisions and some components of physical community such as shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience. E

5235 Urban and Site Design II (3-6) Prereq: 5230.

5270 Planning and Transportation (3) (Same as Civil Engineering 5270.) W

5280 Planning Methods (6) Tooling up studies; methods for preparation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5180, Sp

5300 Regional Planning (3) Making planning process operative in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by states, single-purpose agency planning, and TVA. Prereq: 5100.

5310 State Planning (3) Evaluation of planning function in state government, with emphasis on institutional environment in which planning occurs. Context and scope of state planning, and relationships with other branches and levels of government. Prereq: 5100.

5340 Implementation (3) Policy formulation, information systems, taxation, capital improvement programming, and other aspects of plan implementation. Programming public actions to affect development. Prereq: 5440. Su, F

5360 New Towns (2) Historical development of planned new towns and implications for national urbanization policy in United States; process by which new towns are created, from establishment of objectives to administration of development process and provision of public services; organizational alternatives for new town planning, development and management in context of past experience and future objectives. Prereq: 5110 and consent of instructor.

5380 Housing (3) Nature and demand for housing in U.S. and abroad with emphasis on U.S. experience. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing. Coreq: 5110 or consent of instructor.

5390 Futures (3) Alternative futures and their implications for future living patterns and community planning. Techniques of future research.

5410-20-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. May be repeated. Prereq: Consent of instructor. E

5435 Planning and Government (3) Governmental context within which planning occurs. Policy making as public process. Planning structures, powers, and policies. F

5440 Planning and Land Use Controls (4) Legal basis for planning and guiding community development. Exercise of police power and eminent domain. Development and administration of zoning, subdivision controls, and related devices. Prereq: 5435. Sp

5455 Urban Revitalization (2) Goals, principles and strategies for restoring and revitalizing cities. Review and analysis of historic, current, and proposed public and private programs aimed at urban revitalization. Physical building and restoration activities as related to financial and administrative requirements. Relationship between construction oriented activities and economic and social development programs is emphasized. Prereq: 5110 or consent of instructor.

5460 Planning Administration (2) Planning agency management, program development, and agency finance. Prereq: 5435.

5465 Planning and Property Development (3) Process of urban physical growth and change with emphasis on functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 5440.

5500 Synthesis (9) Problem-oriented experience to integrate knowledge from previous courses. Interrelationships stressed; student required to use judgment in evaluation and creation of plans and policies addressed to real world situations. Extensive laboratory experience. Prereq: Required planning courses or consent of faculty. F, W

5670 Social Planning (2-3) Theory, philosophy and implications of programs for planned social change. Consideration of major social planning issues in diverse fields of service; aging, corrections, education, health, social services. Prereq: Consent of instructor. (Same as Social Work 5670.)
Graduate School of Social Work

Ben P. Granger, Dean
Betty J. Cleckley, Associate Dean
Lou M. Beasley, Branch Director, Knoxville
M. Kate Mullins, Branch Director, Memphis
Roger M. Nolte, Branch Director, Nashville
Ronald K. Green, Director, Office of Continuing Social Work Education

The University of Tennessee School of Social Work is a fully accredited two-year graduate professional school, with a program (thesis or non-thesis option) leading to the degree of Master of Science in Social Work. The full two-year curriculum is offered in all three branch locations.

GRADUATE PROFESSIONAL EDUCATION
The School of Social Work has as its primary objective the education and training of persons for leadership in the social welfare profession and the social work practice community. Leadership roles include positions in social welfare administration, social planning and policy development, and positions as treatment team leaders, supervisors, consultants, and expert practitioners.

Central to professional leadership are a commitment to the values and goals of the profession and a developed capacity for self-awareness and self-discipline. The experience of a graduate professional education builds commitment, and the School's program guides students into independent, analytical thought and prepares them to use their skills and knowledge to effective purpose.

The School of Social Work recognizes and enjoys the challenge of cultural pluralism in society and encourages applications for admission from minority group members. Through the planned inclusion of significant and pertinent racial and ethnic content in the curriculum, the School provides students with the educational background needed to take creative roles in the social work profession's efforts toward the elimination of racism and such other social ills as poverty, crime, neglect, and social injustice.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, 2014 Lake Avenue, Knoxville, Tennessee 37916.

AREAS OF PROFESSIONAL PRACTICE
Specializations within the School's curriculum prepare students for social work careers in such practice fields as criminal and juvenile justice systems; family and child welfare services in public and voluntary agencies; group services in neighborhood and community centers; health services; mental retardation; public welfare services; mental health services; rehabilitation services; school social work; and social gerontology.

THE PROFESSIONAL CURRICULUM
The School of Social Work's curriculum is designed to provide the student with the basic components of professional competence through a progression of course work and supervised practice experience. Students may elect a thesis or non-thesis option. The two-year, six-quarter program includes a core curriculum, a specialization in one of two areas—social work treatment or social welfare administration and planning—and concurrent field practice.

The Core Curriculum
The core curriculum is offered during the first two quarters of the first year and is required of all students. It is a 30-quarter-hour sequence of five basic courses. As the initial phase of the School's educational program, the core curriculum contributes to the process of socialization and professional identification, and presents students with a comprehensive and broad knowledge base from which to operate in the future as practitioners and administrators.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Year</td>
<td>5070</td>
<td>Social Work Research I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5110</td>
<td>Social Welfare Policy and Services I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5210</td>
<td>Human Behavior and Social Environment I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5410</td>
<td>Social Work Practice</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5910</td>
<td>Field Practice</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Year</td>
<td>5220</td>
<td>Human Behavior and Social Environment II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5420</td>
<td>Social Work Practice II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5920</td>
<td>Field Practice</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring Year</td>
<td>5080</td>
<td>Social Work Research II</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5120</td>
<td>Social Welfare Policy and Services II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5230</td>
<td>Human Behavior and Social Environment II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5320</td>
<td>Social Work Practice III</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5930</td>
<td>Field Practice</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Year</td>
<td>5940</td>
<td>Field Practice</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>5950</td>
<td>Specialization Courses or Electives</td>
<td>2 or 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL QUARTER HOURS</td>
<td>10 or 11</td>
</tr>
<tr>
<td>Spring Year</td>
<td>5960</td>
<td>Field Practice</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>5961</td>
<td>Integrative Seminar</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5970</td>
<td>Specialization Courses or Electives</td>
<td>2 or 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL QUARTER HOURS</td>
<td>12 or 13</td>
</tr>
</tbody>
</table>

AREAS OF SPECIALIZATION
Social Work Treatment
Social work treatment deals with those individual, family, and group methods utilized to enhance the social functioning of individuals and effectively ameliorate problems of social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methodology...
The student's career objectives, and have the graduate credit, relevant to social work and to Social Work or outside, must be acceptable for curriculum.

DEGREE REQUIREMENTS

1. Satisfactory completion of the curriculum.
2. All courses taken as part of the degree programs, whether taken within the School of Social Work or outside, must be acceptable for graduate credit relevant to social work and to the student's career objectives, and have the approval of the student's faculty advisor.
3. Achievement of a B average on all work presented for the Master's degree.
4. Completion of each required course at a satisfactory level (a grade of C or above). Graduate courses may not be repeated to raise a grade.
5. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
6. Students who elect a non-thesis option must pass a written comprehensive examination.
7. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.
8. The minimum number of credit hours required for a degree shall be 79 hours including a maximum of 36 S/NC hours.
9. Performance at a satisfactory level in field practicum, which is designed to teach professional practice skills.

ADMISSION REQUIREMENTS

Admission to the professional curriculum is based on the following requirements:

1. A Bachelor's degree from an accredited college or university with some preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in the social sciences, humanities, physical sciences, and other liberal arts subjects.
2. A grade point average of 2.5 on a 4.0 scale, with those falling below the average to be admitted on supplemental evidence of ability to perform at a satisfactory level.
3. Personal qualifications acceptable for entrance into the professional practice of social work.
4. Preference is given to applicants with a B average on all work and a B or better in the last 60 hours of undergraduate work.
5. Students who elect a non-thesis option must have a B average on all work.
6. Students who elect a non-thesis option must pass a qualifying examination as part of the admission process.
7. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied.
8. The minimum number of credit hours required for a degree shall be 79 hours including a maximum of 36 S/NC hours.

ACCELERATED PROGRAM

The University of Tennessee School of Social Work has a special accelerated program which enables eligible candidates to complete the M.S.S.W. degree in four quarters. Application for admission to the accelerated program is through the regular admission process. Applications should be filed not later than December 31 for the Memphis program and not later than January 31 for the Nashville program.

TRANSFER CREDITS

Courses completed in another accredited graduate school of social work are usually accepted for the School of Social Work degree requirement providing the applicants meet the admission requirements of The Graduate School and the University of Tennessee School of Social Work, and if previous courses are equivalent to required or elective courses offered here, the University of Tennessee School of Social Work allows a maximum of 45 credit hours of graduate course work from an accredited institution to be transferred into the student's Master's program. Such work must...
course work must be completed within the six-year period prior to the receipt of the degree. In addition, S/N credit earned for the field practicum is also accepted.

Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the School of Social Work and the student’s major professor.

Faculty

Professors: B. P. Granger (Dean), Ph.D. Brandeis; M. H. Bloch, M.S. Ohio State; R. C. Bronovich, D.S.W. Washington; G. W. Frier, E.D. Columbia; G. McLaren (Emeritus), M.S.S.W. Tennessee; M. K. Mulligan, Ph.D. Chicago; R. M. Neele, D.S.W. Tulane; B. Orchard (Emeritus), M.S. Western Reserve; S. W. Spencer (Emeritus), M.S. New York School of Social Work.

Associate Professors: G. W. Ayers, D.S.W. Tulane; L. M. Beasley, Ph.D. Denver; W. J. Bell, D.S.W. Tulane; B. J. Cleeckley, Ph.D. Brandeis; W. C. Cook, D.S.W. Tulane; J. C. Eades, Ph.D. Southern Illinois (Carbondale); R. W. Falcon, Ph.D. City University of New York; M. Fair, Ph.D. M. H. Gainer, D.S.W. Pennsylvania; M.S.S.W. Columbia; C. F. Hainost, Ph.D. Western Reserve; H. Hirayama, D.S.W. Pennsylvania; P. D. Kurth, Ph.D. Michigan; P. Landon, Ph.D. Denver; E. K. Marshall, Ph.D. St. Louis; A. E. Moses, D.S.W. California (Berkeley); R. B. Rowen, Ph.D. Arizona; R. Rubenstein, Ph.D. Chicago; D. A. Sarfati, M.S.; M. Simmonds, P. Tate, Ph.D. Pennsylvania; H. S. Veague, M.S.S.W. Tennessee; A. R. Wachter, M.S.S.W. Tennessee; C. S. Wilkes, Ph.D. St. Louis; P. G. Zarbock, M.S. Wisconsin.

Assistant Professors: J. R. Cates, Ph.D. Michigan; M. Catling, Ph.D. Washington; J. Charing, M.S.S.W. Tennessee; J. C. Coller, M.S., W. Tulane; H. P. Coyle, Ph.D. Western Reserve; I. C. Faust, M.S.S.W. Tennessee; A. R. Ford, M.S.W. Cal.; V. A. Gates, M.S.S.W. Tennessee; W. D. Harrion, Ph.D. Minnesota; K. Hirayama, D.S.W. Pennsylvania; J. F. Janovic, Ph.D. Rutgers; D. C. Johnson, M.S.S.W. California (Berkeley); J. R. Micheal, M.S.S.W. Ohio State; D. Parker, M.S.S.W. Loyola; P. R. Pogdo, Ph.D. Washington; M. P. Strong, M.S.S.W. Tulane.

Courses

5000 Thesis (1-15) E

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

5070-80 Social Work Research I, II, III (2) Research methodology as applied to problems in social welfare. Problem formulation; research design; instrument construction; data collection, analysis, and presentation; and research reporting. F, W

5081 Evaluative Research in Social Work (2-3) Advanced research course. Topics include sociopolitical context of evaluate research, research design and methodology appropriate to evaluative research, and utilization of research findings. Prereq: Completion of core or consent of instructor. Sp

5082 Practicum in Social Work Research (3-9) Supervised practice in application of research methods and tools to social welfare program. Problem may be generated by faculty, students, or social welfare agency or organization. Prereq: 5070-80 and consent of faculty member conducting investigation. Si, W

5083 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 4 hrs. F, W, Sp

5090 Special Problems in Social Work (2-9) Individual study or research on problems of special significance to the social work student under supervision of major professor. May be repeated. F, W, Sp

5110 Social Welfare Policy and Services I (3) Interests of social work profession in development of contemporary social policy at local, state, national, and international levels of organization. Contribution social work professionals can make to formal policy-making process through which macro social change is effected, and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Policy lab may be used to focus on beginning skill development. F

5120 Social Welfare Policy and Services II (3) Examination of theories of complex organizations applied to social welfare service delivery settings. Transformation of collective social welfare resources into indivisible and indivisible social welfare benefits through organized institutional action of professional nature. W

5130 Social Policy Analysis (2-3) "Policy science" techniques to organize and analyze extraordinary in assessing social, political, and economic implications of social policy proposals. Prereq: Completion of core or consent of instructor. F, W

5161 Social Welfare Seminar (2-3) Problem areas of field practice seminar on substantive knowledge about social policy or condition and interrelationships of, in, social, community: social work, policy, social welfare program, and social work practice. Fields such as health, mental health, child and family welfare, mental retardation, education, corrections, housing, labor force development, income maintenance, and aging. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 9 hrs. F, W

5210-20 Human Behavior and Social Environment I and II (3, 3) Examination of theories pertaining to individual, family, and small group within context of functions, structures, roles and processes. Behavior of these systems conceptualized as normal, dysfunctional, and abnormal. Continuum. Organizations, development and maturation, adaptive and defensive mechanisms. Open system approach used to understand interrelationships of biological, psychological, and social variables with emphasis on implications of culture and ethnicity. F, W

5280 Special Accelerated Program in Social Work (1-4) Undergraduate and graduate students with intensive academic and field practice experience that qualifies them to enter second year of graduate study upon successful completion of this term. S/N only.

5310 Human Behavior and Social Environment (2-3) Deepens and extends student's knowledge or range of abilities to understand and utilize knowledge from optimum social functioning through pathology. Prereq: Second-year status may be repeated.

5311 Imaginative Perspectives on the Human Condition (2-3) Examination of usefulness to social work students of pro's, drama, and poetry, which illuminate and expand knowledge and appreciation of every person's humanness. Adaptive and maladaptive responses to extraordinary life situations and events, portrayed by creative writers. Artistic representation of molding of human personality and socialization. Interaction of persons with one another and with society. Prereq: Completion of core or consent of instructor.

5312 Psychopathology and Social Deviance (2-3) Theories and recent research in etiology of psychosocial dysfunction and social variance. Categorical approach to psychopathology examined and differentiated from other approaches to human behavior. Prereq: Completion of core or consent of instructor.

5313 Deviant Behavior of Children and Youth (2-3) Deviant behavior and conduct disorders in children and youth, etiology, symptomatology, and research development. Prereq: Completion of core or consent of instructor. F

5314 Comparative Theories of Personality (2-3) Those personality theories with most relevance for social work practice with individuals, groups, or families. Prereq: Completion of core or consent of instructor. Taught at branches only. Available at UT as Psychology 4516.

5315 Human Sexual Problems (2-3) Desensitization and reorientation of personal and social attitudes toward sexual behavior, clinical problems and approaches to make social workers better able to deal with clients with sexual problems. Prereq: Completion of core or consent of instructor.

5316 Mental Health and Employment (2-3) Work as major life task and value, attitudes toward work, patterns of employment, effect of changing technologies on individual and community, interdependence of individual and organization, meaning of work in assessing mental health. Prereq: Completion of core or consent of instructor.

5317 Social Work and Black Families (2-3) Historical and contemporary theories regarding Black families, emphasis of framework to assess and plan for Black families within service delivery systems. Prereq: Completion of core or consent of instructor.

5410 Social Work Practice I (3) Basic theory and values and beginning skills development generic to social work intervention at various system levels. Combines classroom skills and laboratory experience. F

5420 Social Work Practice II (3) Assessment, planning, methodology and skills development fundamental to social work intervention. Combines classroom skills and field placement. W

5440 Family Therapy in Social Work Practice (2-3) Application of practice theory to assist in acquisition of skills in treatment of family as unit. Prereq: Completion of core or consent of instructor.

5441 Transactional Analysis (2-3) Philosophy, theory, and therapeutic technique of transactional analysis. Lectures, discussion, and experiential methods facilitate acquisition of knowledge and skills to use transactional analysis as treatment modality. Prereq: Completion of core or consent of instructor.

5442 Short-term Treatment (2-3) Theory and practice of short-term treatment focusing on nature of method: characterization, techniques, and approach, and designs of programs providing short-term treatment services. Specific techniques of assessment and treatment of selected individuals in crisis. Prereq: Completion of core or consent of instructor.

5443 Seminar on Behavior Therapy (2-3) Basic behavior modification methodology applied to clinical assessment, choice of descripts for group treatment, and design of programs providing short-term treatment services. Specific techniques of assessment and treatment of selected individuals in crisis. Prereq: Completion of core or consent of instructor.

5460 Social Work Treatment with Individuals and Family (3) Social work literature, social casework as method of social work practice and as form of interpersonal treatment. Prereq: Completion of core or consent of instructor.

5470 Contemporary Treatment Modalities: Individual and Family (2-3) Established and developing treatment modalities in terms of essential concepts. Differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor.

5480 Special Topics in Social Work Treatment (2-3) Treatment with individuals, families, and small groups.
groups. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp.

5560 Social Work Treatment with Groups (2-3) Development of knowledge and skill in use of group methods in social work practice; organization and functioning of group, structuring group tasks and experiences, understanding and enhancing group functioning, enabling problem-solving effectiveness, facilitating group decision making, and evaluating individual change and group effectiveness. Prereq: Completion of core or consent of instructor. Sp.

5561 Interpersonal Skill Development (2-3) Training in interpersonal skills needed to enhance interpersonal competence in application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

5570 Comparative Methods of Group Treatment (2-3) Comparative analysis and critical review of theory and methodology of some of major group treatment modalities with emphasis on theory-base, leadership, techniques and procedures, and research. Prereq: Completion of core or consent of instructor. A.

5601 Social Work in Rural Communities (2-3) Characteristics of rural populations and rural communities, analysis of differences between urban and rural, and implications for social work services in rural areas. Prereq: Completion of core or consent of instructor. W.

5621 Community Organization (2-3) Using behavioral and social science knowledge about community structure to aid in development of resources to meet human needs. Prereq: Completion of core or consent of instructor. S.

5670 Social Planning (2-3) (Same as Planning 5767) Social work planning; goals and objectives; roles and strategies for development of social services. Prereq: Completion of core of consent of instructor. F.

5671 Planning and Management of Change in Social Welfare (2-3) Theories and models of change such as planned change, conflict, and evolutionary change in relation to organizational change, community improvement, locality development, and economic development related to social welfare services. Prereq: Completion of core or consent of instructor. F.

5701 Administration in Social Work (2-3) Introduction to administrative practice as it relates to social work purpose and values and development of administrative principles that make possible effective provision of social welfare services. Prereq: Completion of core or consent of instructor.

5702 Organizational Design of Social Welfare Agencies (2-3) Critical problems of adapting organizational structure and operational patterns to tasks, objectives, and mandates. Planning and design techniques for new programs and for modification of existing programs to appropriate deployment of resources and personnel for maximum effectiveness and efficiency. Integration of theory and experience for development of practical skills for coping with variety of situations. Prereq: Second-year administration or community organization student, or consent of instructor; 5761 or equivalent. Sp.

5741 Supervision in Social Work (2-3) Dual roles of supervisor, subject matter expert, and administrator distinguished from consultation and from direct practice. Responsibility and accountability to client system, supervisor, and executive, problems of middle management position of supervisor. Differences and similarities in supervision of varying levels of personnel, groups, tasks, techniques, and processes in relation to individual and group supervision and field instruction. Prereq: Second-year status or consent of instructor.

5742 Consultation in Social Work (2-3) Constellation of roles, relationships, and behaviors required of consultant. Consultation as distinguished from supervision and direct practice. Theory of consultation in relation to various settings and levels of responsibility. Processes and practices of consultation and dilemmas of consultant's position. Prereq: Second-year status or consent of instructor.

5743 Management of Human Resources in Social Welfare (2-3) Personnel function in administration of human services programs and agencies. Personnel recruitment, selection, appointment, and supervision; staff development, training, and evaluation; salary and benefit systems; employer-employee relations; and personnel services. Prereq: Completion of core or consent of instructor. W.

5744 Education and Training in Social Welfare (2-3) Philosophies and practices of teaching and learning related to adults in social work and social welfare. Distinctions between teaching and learning; training and education; unique aspects of adult learning; measurement issues; models and styles of education. Prereq: Completion of core or consent of instructor. W.

5745 Professional Leadership in Social Work (2-3) Leadership in social welfare. Theories of leadership; complexity of leadership; function, effectiveness, and satisfactions of leaders; leadership styles, values, motivation and morale; and leadership development and training. Prereq: Completion of core or consent of instructor.

5761 Social Welfare Administration and Planning (3) Topics significant to managerial-planner role such as decision making, budgeting, planning, and programming. Prereq: Completion of core or consent of instructor. Sp.

5762 Seminar in Social Welfare Administration and Planning (3) To assist students in acquiring specific administrative techniques appropriate for social welfare delivery systems. Prereq: Completion of core or consent of instructor.

5771 Information Systems and Decision Making (3) Decision making in human services organizations, utilization of information in policy formulation, delivery of services and evaluation of organizational performance. Information generation, collection, processing, storage, retrieval, and utilization in relation to management control, evaluation and forecast. Prereq: Completion of core or consent of instructor. F.

5772 Financial Management for Social Welfare Administration (2-3) Centralized decision making related to allocation of scarce resources in social services organizations. Technical aids to budgetary choice and other aspects of financial management examined for utility, parsimony, and feasibility. Prereq: Completion of core or consent of instructor.

5800 Management of Residential Settings (2-3) Issues and trends in management and programming in residential institutions for children, aged, mentally ill, mentally retarded, juvenile, adult offenders, and other groups. Prereq: Completion of core or consent of instructor.

5812 Organizational Perspectives in Juvenile Justice (2-3) Aspects of juvenile justice system: theoretical and practical application of substantive knowledge to comprehensive problem-solving within existing service and community systems. Critical appraisal of functional relationships between problem, policy, planning, practice, and outcomes. Examination of problems from practice to determine key elements of optimal services and implications for policy decisions. S/NC only.

5871 Planning and Management of Change (2-3) Critical problems of adapting organizational structure and operational patterns to tasks, objectives, and mandates. Planning and design techniques for new programs and for modification of existing programs to appropriate deployment of resources and personnel for maximum effectiveness and efficiency. Integration of theory and experience for development of practical skills for coping with variety of situations. Prereq: Second-year administration or community organization student, or consent of instructor; 5761 or equivalent. Sp.

5890 Practicum in Governmental Social Welfare Policy Making (2-3) Practical introduction to process of legislative and administrative policy making at state or local governmental level through assignment of students to offices of elected or appointed policymakers. Limited social welfare policy research activities. Seminar to present normative and descriptive theory about policy-making process, and models of policy analysis. Prereq: 5110 and consent of instructor. May be repeated.
Index

Examinations:
Admission, 8, 9, 11
Comprehensive, 20
Diagnostic, 20
English Proficiency, 11, 15
Final, 19–21
Oral, 19–21
Proficiency, 15
Qualifying, 20
Written, 19, 20
Expenses, 12, 13
Experiment Stations:
Agricultural, 23
Engineering, 67
Explanation of Course Listings, 14
Extension Service, Agricultural, 23
Facilities and Services, 16
Faculty Members, Admission of, 11
Failures, 14
Fee Classification, 13
Federally Educational Rights and Privacy Act, 12
Fees, 12–13
Fellowships, 3, 13
Final Examinations, 19–21
Finance, 40
Financial Aid, 3, 13
Food Science, 90
Food Systems Administration, 91
Food Technology and Science, 24, 28
Foreign Language Education, 82
Foreign (International) Students, Admission of, 11
Foreign (International) Students, Office of, 17
Forestry, 24, 29
French, 136
General Regulations, 14
Geography, 114
Geological Sciences, 115
Geology, 115
German, 117
German Language and Literature, 117
Germanic and Slavic Languages, 117
Grades, 14, 15
Grading System, 14, 15
Graduate Assistantships, 13
Graduate Council, 6
Graduate Course Numbers, 14
Graduate Credit, 14
Graduate Management Admission Test, 8–9, 12, 35
Graduate Record Examination, 8–9, 12
Graduate Research Centers and Institutes, 17
Graduate School Administration, 6
Graduate School News, 10
Graduate School Regulations, 14
Graduate Student Responsibility, 10
Graduate Studies and Research, 10
Graduation Fee, 12
Graduation Requirements, 21–22
Greek, 110
Guidance, 56
Handicap Student Services, 3, 16
Health Education, 82
Health, Physical Education, and Recreation, School of, 62
History, 118
Home Economics, 89
Home Economics, College of, 87
Child and Family Studies, 88
Home Economics, 89
Home Economics Education, 61, 89
Nutrition and Food Sciences, 90
Textiles, Merchandising and Design, 91
Home Economics Education, 61, 89
Horticulture, 30
Housing, 3, 16
Incompletes, 15
Industrial Education, 62
Industrial Engineering, 80
Industrial and Organizational Psychology, 95
In-state Fee Classification, 13
Institute of Agriculture, 23
Instructional Media and Technology, 52
Aero/College Programs: 93
Aviation Systems, 93
Comparative and Experimental Medicine, 94
Ecology, 84
Industrial and Organizational Psychology, 95
Life Sciences, 96
Management Science, 96
Interior Design and Housing, 91
International Students, 11, 17
International Student Affairs Office, 3, 17
International Students Admission, 11
Italian, 136
J.D.-M.B.A. Program, 35
Journalism, 47
Kingsport University Center, 18
Language Requirements, 20
Late Registration Fee, 12
Latin, 110
Law Courses, 15
Liberal Arts, College of: 97
Anthropology, 97
Archeology—Greek and Roman, 99
Art, 99
Audiology and Speech Pathology, 101
Biochemistry, 104
Botany, 105
Chemistry, 107
Classics, 110
Computer Science, 110
Cultural Studies, 112
Economics, 112
English, 112
French, 114, 136
Geography, 114
Geological Sciences, 115
Germanic and Slavic Languages, 117
Greek, 110, 118
History, 118
Latin, 110, 120
Mathematics, 120
Microbiology, 32, 124
Music, 125
Philosophy, 127
Physics and Astronomy, 129
Political Science, 131
Psychology, 132
Radiation Biology, 135
Religious Studies, 135
Roman Languages, 135
Russian, 117, 137
Sociology, 137
Spanish, 137, 139
Speech and Hearing Sciences, 101, 139
Speech and Theatre, 139
Speech Pathology, 140
University Studies, 140
Zoology, 140
Library, University, 16
Library and Information Science, School of, 151
Library Science, 151
Life Sciences, 96
Linguistics, 112
Loans, 3, 14
M.A.C.T. Program, 8–9, 12
Maintenance Fee, 12
Major Professor, 14
Majors Available, 8–9
Management, 41
Management Development Programs, 37
Management Science, 41, 96
Map, Campus, 4–5
Marketing, 42
Married Student Housing, 16
Martin Graduate Education Program, 18
Master’s Committee, 18
Master’s Degrees, 8–9, 18, 21
Master of Arts, 38, 97, 100, 101, 112, 117, 118, 120, 125, 127, 131, 132, 135, 137, 139
Master of Accountancy, 37
Master of Arts in College Teaching, 39, 50, 112, 117, 118, 129, 137
Master of Business Administration, 33
Master of Engineering, 72, 75, 80, 82, 85
Master of Fine Arts, 100, 139
Master of Mathematics, 121
Master of Music, 125
Master of Public Administration, 131
Master of Public Health, 83
Master of Science, 23, 38, 44, 45, 49, 50, 51, 52, 55, 56, 58, 60, 62, 63, 64, 67, 68, 72, 75, 79, 80, 82, 85, 87, 93, 94, 95, 96, 104, 105, 107, 110, 114, 115, 120, 124, 129, 140, 148
Master of Science in Library Science, 151
Master of Science in Nursing, 144
Master of Science in Planning, 153
Master of Science in Social Work, 155
Mathematics, 120
Mathematics Education, 52
Mechanical Engineering, 83
Medical Biology, 143
Medicine, College of, 143
Medical Biology, 143
Metallurgical Engineering, 69
Microbiology, 32, 124
Music, 125
Music Education, 50
Music Fee, 12
Nashville Graduate Engineering Program, 18
Non-Degree Admission, 10
Non-Thesis Programs, 19
Non-Thesis Registration, 19
Nuclear Engineering, 85
Nursing, College of, 144
Nutrition, 90
Oak Ridge Programs, 18
Oak Ridge School of Biomedical Sciences, 18, 148
Off-Campus Centers, 18
Off-Campus Housing, 16
Office Administration, 43
Office Hours, 3
Ombudsman, 17
Oral Examinations, 19–21
Ornamental Horticulture and Landscape Design, 30
Out-of-state Fee Classification, 13
Parking Rules, 16
Passing Grades, 14
Pathobiology, 32
Philosophy, 127
Physical Education, 64
Physically Disabled, 16
Physics, 129
Planning, School of, 153
Plant and Soil Science, 24, 31
Plant Pathology, 26
Political Science, 131
Polymer Engineering, 71
Portuguese, 137
Prerequisites, 14
Privacy Act, 12
Procedures: Admission, 11