3070 Genetics and Society (3) (Same as Botany 3070).

3410 Principles of Cultural Anthropology (3) Basic concepts and objectives of cultural anthropology; a brief history of cultural phenomena and approaches to its study. Recommended prereq: 2530.

3440 Religion of Primitive Peoples (3) Religions of nonliterate peoples. Place of religion in their social and cultural systems. Recommended prereq: 2530. (Same as Religious Studies 3440.)

3450 Community Studies in Complex Culture (3) Review of cross-cultural comparative urban and village communities and methodologies used in community studies. Recommended prereq: 2530.

3510 Peoples and Cultures of Mainland Asia (3) Ethnographic survey of the indigenous cultures of mainland Asia, ecology in area perspective. Recommended prereq: 2530.

3530 Peoples and Cultures of Africa (3) Ethnographic survey of the aboriginal cultures of sub-Saharan Africa. Cultural diversity and human ecology in area perspective. Recommended prereq: 2530.

3540 North American Indian (3) An ethnographic survey of cultures of Arctic, Southwest, Plains and Eastern Areas. Emphasis on cultural differences of peoples occupying these areas during prehistoric times. Recommended prereq: 2530.

3555 Cherokee Ethnohistory (3) Survey of sociopolitical aspects of internal affairs and external relationships from first European contact to present. Emphasis on eighteenth and nineteenth centuries.

3580 Peoples and Cultures of Mesoamerica (3) Ethnographic survey of aboriginal peoples and post-conquest changes in Indian cultures. Emphasis on the impact of small rural communities using modern village studies as source material. Recommended prereq: 2530.

3610 Archaeology of United States and Canada (3) Survey of prehistoric peoples of north of Mexico from initial occupation to European contact. Recommended prereq: 2530.

3620 European Prehistory I (3) Cultural developments during Paleolithic, Mesolithic, and Neolithic. Recommended prereq: 2530.

3630 European Prehistory II (3) Cultural developments during the Metal Ages. From the close of Neolithic through Iron Age. Recommended prereqs: 2530 and 2530 should be taken in sequence.

3640 Ancient Civilization of Mesoamerica (3) Introduction to archaeology of areas of advanced Indian culture in Mexico and Central America beginning with earliest cultures and proceeding to contact with Europeans. Recommended prereq: 2530.

3660 Prehistory of Tennessee (3) History of archaeological research in Tennessee and survey of prehistoric American Indian cultures identified through research.

3670 Principles of Archaeology (3) Research strategies in archaeological excavation, interpretation, and explanation. Prereq: 2530 or consent of instructor.

3700 Forms of Folklore (4) Introduction to the ethnological study of folklore.

3710 European Folk Cultures (3) Traditional aspects of life, as expressed in technology, beliefs, art, and folklore, under changing historical and socioeconomic conditions.

3800 Language and Culture (3) Relationship between linguistic categories and patterns of culture. Prereq: 2530 or consent of instructor. Recommended: 2530.

3811 Introduction to Museology (3) (Same as Art 3811.)

3900 Human Osteology (4) Intensive examination of the human skeleton. Prereq: 2510 and consent of instructor. 3 hrs and 1 lab.

3920 Principles of Physical Anthropology (3) Survey of materials and methods in physical anthropology. Recommended prereq: 2510.

3930 The Biology of Races of Man (3) Processes of human variation and classification, racial differences among existing stocks; influence of biology and culture in race formation; analysis of studies of racial differences and demic, sexual, and race mixture; and constitution growth and nutrition. Recommended prereq: 2510.

3950 Human Identification (3) Introduction to techniques in identification of human skeletal material. (Same as Curriculum and Instruction 4110.)

4111 Non-Western Education: Anthropological Approaches (3) Analysis of traditional educational practices among non-Western peoples and problems encountered from application of Western models of education among those peoples. Particular attention is paid to American Indians, African tribal groups, and Asian peoples. (Same as Curriculum and Instruction 4111.)

4200 Contemporary North American Indian (3) Survey of Indian cultures from initial Euro-American contacts to present. Emphasis on culture change, U.S. Government Indian policy, reservation life. Prereq: 2530 or consent of instructor.

4210 Ethnographic Research Techniques (3) Methodological procedures in utilizing data. Prereq: Consent of Instructor.

4240 Applied Cultural Anthropology (3) Applications of anthropological theory, methods and findings in programs of community and national development, public health, international, and military assistance. Examination of the roles of anthropologists, questions of values and ethics in international relations, and of organizational planned changes in applied programs. Intensive analysis of selected case studies. Prereq: 2530.

4250 Medical Anthropology: Lecture (3) A survey of medical anthropology. Emphasis on Western and non-Western cultural aspects of health, disease, treatment, death, and related concepts. Focus on analyzed and descriptions of anthropological fieldwork.

4260 Medical Anthropology: Laboratory (3) Fieldwork in medical anthropology. Emphasis on cultural aspects of health, disease, and death in industrial societies and folk medicine systems which coexist with Western, technical medicine. Coreq or prereq: 4250.

4300 Readings in Anthropology (1-9) Intensive reading, study, and research under supervision of instructor. May be repeated. Maximum 9 hrs.

4340 Field Work in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing of data, intensive reading. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4360 Field Work in Physical Anthropology (3-9) Practicum in collection and analysis of human biological data. May include either skeletal or living populations. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4400 Cultural Ecology (3) Survey of concepts and methods of cultural ecology and association between cultures and their environments. Topics include ecological theory, methods of analysis, and application to archeological case studies. Prereq: 2530, 2530, 3410 or consent of instructor.

4420 Dynamics of Culture (3) Culture change: innovation, diffusion and acculturation; cultural continuity and stability. Prereq: 2530 or consent of instructor.

4430 Personality and Culture (3) Analysis of relations among individual, society, and culture. Application of psychological techniques in cross-cultural studies. Cultural differences and their influence on group behavior. Prereq: 2530 or consent of instructor.

4440 Urban Anthropology (3) Survey of theoretical and methodological issues anthropologists encounter researching cross-cultural urban settlements. Focus is on anthropological perspective and urban problems and planning. Prereq: 3450 or consent of instructor.

4480 Current Trends in Anthropology (3) Analytical integrative review in symposium of the current debates, research directions, theories, fieldwork methods, and ethnographic limitations of the four subfields of anthropology: archaeology, physical anthropology, linguistics, and cultural anthropology.

4490 Cross-Cultural Survey of Sex Roles and Behavior (3) Examination of sex roles and sex behavior from cross-cultural and diachronic viewpoints. Problems of contemporaneous and historic role comparison and sex roles. Prereq: 2530 or consent of instructor. Maximum 3 hrs.

4510 Peoples of China I: Chinese Society After 1839 (3) Anthropological perspective on society and culture in the period of intense Western contact, rejection of the West, and development of modern China, society, culture, and behavior. Prereq: 2530 or consent of instructor. Recommended: 4500 or an East Asian course.

4550 Indians of the Southeastern United States (3) Survey of Southeastern Indian cultures; emphasis on aboriginal adaptation to environment; changes of Southeastern American groups prior to Euro-American contact. Prereq: 2530, 3540 or consent of instructor.

4560 Cherokee Ethnohistory (3) Intensive survey of ideology and material aspects of Cherokee culture existing at time of European contact. Prereq: 2530.

4570 Peoples of Southeast Asia (3) Survey of representative ethnic groups and indigenous cultures of mainland and island Southeast Asia. Prereq: 2510 or consent of instructor. Prereq: 2530, consent of instructor or an East Asian course.

4580 Asians in the Americas Since 1800: Anthropological Perspectives (3) Character, factors, and motivations in Asian immigration to North, Central and South America. Assimilation pattern and enclave communities are major topics. Major units are per national and per generation.

4590 Peoples of Japan (3) Analysis of the cultural diversity and unity of peoples of Japan. Prereq: 2530 or consent of instructor. Recommended: 2530 or an East Asian course.

4600 Method and Theory in American Archaeology (3) Historical development of New World archaeology with emphasis on theory and field techniques. Prereq: 2520 or consent of instructor.

4610 African Prehistory (3) Survey of cultural history in Africa, south of the Sahara, from earliest evidence of human activity to time of European contact. Prereq: 2530 or consent of instructor.

4640 Zoarchaeology (3) Basic osteological studies of vertebrate classes; emphasis on aboriginals man's utilization of native animals in his subsistence and culture. Identification, analysis, and interpretation of archaeologically derived molluscan and vertebrate remains.

4650 Archaeology of Southeastern United States (3) Intensive study of prehistoric American Indian. Special emphasis on Tennessee prehistory. Prereq: 3610 or consent of instructor.


4720 American Folklore (3) Anthropological perspectives on folklore of geographical regions.
of Art as (1) a minimum enrollment of 6 hours per quarter, and (2) use of Department of Art facilities so that discussion and criticism is available to students. Final examinations are oral, concurrent with project exhibition.

Curriculum:  

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Project in Lieu of Thesis</th>
<th>Art history</th>
<th>Electives</th>
<th>Seminar in Art Criticism</th>
<th>Seminar in Art History</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>

**Quarter Requirements for M.F.A.**

1. Successful completion of 30 hours of studio in concentration area. Inter-area studies must normally be approved by the faculty no later than the third quarter in residence. Fifteen hours of the major must be in second year courses (5155, 5255, 5355, etc.).

2. Twelve hours of art history for graduate credit.

3. Seminar in Art History (4 hours) and Seminar in Art Criticism (4 hours).

4. Ten hours of electives which may consist of any committee-approved combination of graduate credit courses outside the student's departmental concentration.

5. First year evaluation: At the end of the three quarters in residence the student must present work for evaluation by the faculty and receive permission to continue in the program.

6. Second year evaluation: With completion of all course work the student must present work for evaluation by the faculty and receive permission to register for Projects in Lieu of Thesis (Art 5999).

7. Art 5999, Projects in Lieu of Thesis (30 hours) is a third year of semi-independent study.

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

**Graduate Minor in the History of Art**

A graduate minor in Art History may be arranged with the consent of the student's committee, the instructors involved, and the Graduate School. Prerequisite is an undergraduate Art History minor, or its equivalent, and reading knowledge of French, German, or Italian, unless waived by the art history faculty.

3516 Typography (4) Theories and techniques of typography and printing as a fine art medium. May be repeated. Maximum 12 hrs.

3517 Airbrush (4) Techniques and creative applications. May be repeated. Maximum 8 hrs. For art majors only.


3750 Northern European Painting: 1350-1600 (4) Painting and printmaking of low countries, France, Germany, and England. Includes inter-
ence of department. Prereq: Determined by department. May be repeated. Maximum 18 hrs.

4215 Painting IV (4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4315 Watercolor IV (4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4406 Special Topics in Sculpture (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.

4415 Sculpture IV (4) May be repeated. Maximum 12 hrs.

4506 Special Topics in Communication Design (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

5110 and 5119. The Master's program or the non-thesis option. Students in both programs are required to take 5110 and a conference with the student's advisor.

THE DOCTORAL PROGRAM

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for research or college teaching careers in the field of speech and language pathology, audiology, or speech and hearing science. This degree program is research oriented, with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study important questions concerning the human act of oral and aural communication. Students will be expected to master the accumulated knowledge in the areas of:

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

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

Specific 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 bases 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; assessment of communicative and language problems including observation and practice with diagnostic tests. Prereq: 3050. (Same as Special Education 4040.)

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

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

2400 Practicum in Speech Development of the Hearing Impaired (3) (Same as Special Education 4200.)

210-20 Language Development of the Hearing Impaired I, II, III (3) (Same as Special Education 4210-20).

250 Introduction to the Psychology and Education of the Hearing Impaired (3) (Same as Special Education 4310.)

310 Stuttering (3) Nature and treatment. Review and integration of various theories. (Same as Special Education 4310.)

320 Clinical Practice in Speech Pathology (1-6) Prereq: 3040, 3050, 3310, 4040, and consent of instructor. (Same as Special Education 4320.) S/NC only.

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

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

400 Voice Disorders (4) Etiology, diagnosis, and treatment of organic and functional voice disorders. Prereq: 3050. (Same as Special Education 4400.)

450 Clinical Practice in Audiology (1-6) Prereq: 4720, 4930, or 4940. (Same as Special Education 4450.) S/NC only.

460 Clinical Practice in Audiology (1-6) Prereq: 4450. (Same as Special Education 4460.) S/NC only.

470 Clinical Practice in Audiology (1-6) Prereq: 4460. (Same as Special Education 4470.) S/NC only.

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

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

550 Problems in Audiology (1-6) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.


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

630 Practical Applications of Language Habilitation Techniques (3) Discussion and demonstration of various methods and procedures used in treating language retarded children. Prereq: 4610 or consent of instructor.

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

650 Speech and Language of the Culturally Different Children: Speech and language differences of children of various minority groups, from different ethnic and class membership, and from different geographic regions: their causes, and their effects upon educational programs.

660 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, speech pathology, and psychology. Prereq: 4610 or consent of instructor.

700 Audiology for Educators of the Deaf (4) Fundamental aspects of hearing, including physics of sound, anatomy and physiology of the ear, etiology and rehabilitation of hearing loss and basic audiometric techniques. May not be used to satisfy requirements of major in Audiology and Speech Pathology.

720 Audiology II (4) Etiology and rehabilitation of hearing loss including pediatric and geriatric aspects, medical treatment and diagnostic audiometry. Prereq: 3710 or 4720. (Same as Special Education 4720.)

750 Noise in the Environment (3) Discussion of extent to which noise problem exists, introduction to methods of selecting, basic techniques in sound and vibration abatement, acoustical factors, and physiological consequences in noise. Knowledge of acoustics is advisable.


830 Aural Rehabilitation: Speechreading and Auditory Training (4) Speechreading as a receptive language process and development of maximum use of residual hearing in acoustically handicapped. Prereq: Consent of instructor. (Same as Special Education 4930.)

840 Advanced Aural Rehabilitation (4) Prereq: 3710 or 4700. Recommended prereq: 4930 and 3050. (Same as Special Education 4940.)

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise required 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.

5400 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. (Same as Special Education 5400.) S/NC only.

5545 Practicum in Hearing Aid Orientation and Communication Counseling (1-6) Practical experience in counseling and fitting for hearing aid users. Consent of members concerning use and expectations of hearing aids; suggestions for better use of communication skills in problem of oral insertion. Prereq: 4720. May be repeated. Maximum 9 hrs. S/NC only.

5550 Practicum in Aural Habilitation (1-6) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5551 Practicum in Aural Rehabilitation (1-6) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5600 Anatomy and Physiology of Speech (3) Structure and function of neuromuscular system involved in breathing, phonation, respiration, and articulation. Prereq: 3065.

5700 Anatomy and Physiology of Hearing (3) Structure of human ear, pathology of hearing impairment, and psychoacoustics of audition. Prereq: 3710.

5711 Physiological Acoustics (3) Techniques for electrophysiological measurement of auditory sensation: sound transmission by ear, distance in ear, and ear as analytic mechanism. Prereq: 3710, 4720, 3065, or consent of instructor.

510 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.

5110 Introduction to Research in Speech and Hearing (3-1) Analysis of research techniques, application of statistics, and completion of pilot research project.

5117 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation used in audiology and speech pathology. Prereq: 3010.

5119 Laboratory in Instrumentation in Audiology and Speech Pathology (1) Laboratory assignments designed to familiarize student with instruments for measuring speech and hearing processes. Prereq: 5117.

5200 Seminar on Stuttering (3) Current significant research in stuttering. Prereq: 4310 or consent of instructor.

5201 Aphasia (3) Historical review of aphasia literature; theories of brain functioning, aphasic classification and etiologies, treatment and rehabilitation. Prereq: 5060 or equivalent or consent of instructor.

5250-30-40 Advanced Clinical Practice in Speech Disorders (1-6, 1-6, 1-6) Prereq: Consent of instructor. S/NC only. May be repeated. Maximum 5730 may be repeated. Maximum 30 hrs. S/NC only.

5350-60-70 Advanced Clinical Practice in Speech Diagnosis (1-6, 1-6, 1-6) Prereq: 4040, 4540, or equivalent. Maximum 5730 may be repeated. Maximum 9 hrs. S/NC only.

5380 Cerebral Palsy (3) Neurological foundations and speech and language training. Prereq: 3310. (Same as Special Education 4330.)

5390 Cleft Palate (3) Etiology, diagnosis and clinical management of cleft palate speakers, emphasis on speech. Prereq: 3310. (Same as Special Education 4390.)


5450 Sound Measurement and Analysis in Hearing Conservation (3) Noise measuring systems and techniques; factors in military and industrial
and information theory in studying the normal language. Prereq: 3200, Psychology 3210 or equivalent.

*May be repeated. Maximum 12 hrs.*
Infrared and Raman Spectroscopy (Physics 5440), Radiation Chemistry (Physics 5510-20), Advanced Thermodynamics and Statistical Mechanics (Physics 5110-20-30); plus minimum of three quarters of approved physical chemistry (e.g., Biochemistry 4210-20-30, Chemistry 3410-20-30) and at least 18 hours of biology beyond the introductory level including at least 3 hours of genetics and 3 hours of physiology. At least 5 hours must be graduate credit in an approved area of specialization which should be identified early so that necessary prerequisites can be taken.

2. Participation in Biochemistry 6410-20-30 and in the advanced biochemistry seminars during the entire period of residence.

4. Preliminary examinations are administered preferably at the beginning of the fall quarter of the student's third year and are designed to test in comprehensive fashion the mastery of the required formal course work listed in items 1 and 2.

5. A dissertation reporting the results of original research shall be carried out during the term of candidacy.

6. A final examination which will be concerned 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 ad hoc committee of the faculty members appointed by the head of the department, at least two of whom shall be members of the department.

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

Cellular and Comparative Biochemistry Laboratory (2) Basic biochemical procedures of general application in biochemistry and molecular biology. Prereq: 1 quarter of analytical chemistry. Prereq or coreq: 410.

Introduction to Physical Biochemistry (3) Introduction to thermodynamics; phase stability and phase change; chemical potential; osmotic pressure; activity and the Debye-Hückel model; electrochemistry; membrane permeability. 4220—Elements of statistical mechanics, diffusion, collision theory; chemical kinetics; catalysis; reaction theory; thermal order kinetics; specialized kinetics of enzymatic processes; some biopolymer considerations. Prereq: Mathematics 1840-50-60, Chemistry 3211-21-31 and 3219-29-39, and an introductory course in biology.

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

5000 Thesis

5010 Biochemical Techniques (2) Theory and laboratory practice in sedimentation, chromatographic and electrophoretic techniques in isolation and characterization of macromolecules of importance in biochemistry and molecular biology. Prereq: 4119 or equivalent. Open to undergraduates with consent of department.


5120 Membranes, Compartments, and the Regulation of Energy Metabolism (3) Examination of metabolic pathways for electron transport, oxidative phosphorylation, and lipid synthesis, storage and degradation, and of intracellular and interorganelle compartmentalization and phenomenon of permeation which make possible biological control of these pathways. Prereq: 4110-20.

5130 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; coenzyme-specific models of catalysis; steady-state, transient, relaxation, and allosteric kinetics of catalysis. Prereq: 4110 and either 4220 or Chemistry 3430.

5220 Structures and Functions of the Nucleic Acids (3) Chemistry of nucleic acids; hydrogen bonding and double-stranded structures; coiling, supercoiling; and higher order structures and environmental considerations; biosynthesis of DNAs and RNAs; repair mechanisms; degrading mechanisms; mechanisms of genetic information storage and retrieval. Prereq: 4110-20 or equivalent.

5230 Protein Synthesis and Its Role in Metabolic Regulation (3) Mechanism of assembly of polypeptide chains; ribosome structure and function; deciphering and genetic code; regulation of transcriptional and translational events (induction, repression, etc.). Prereq: 4110-20.

5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs.

5310-20-30 Experimental Techniques (2, 2, 3) Tutorial laboratory course in modern experimental methodology and instrumentation. Open primarily for departmental majors.

Graduate special topics (1-3) Registration only by prior arrangement with department. May be repeated. Maximum 9 hrs.

5450 Advanced Topics in Biochemistry (2, 2) Seminars and lectures dealing with current advances in field of chemical biology. May be repeated with consent of department. S/NC only.

Advanced Special Topics (1-3) Registration only by prior arrangement with department. For students who have passed Ph.D. preliminary examination or are in advanced state of graduate studies. Topic title posted in advance. May be repeated. Maximum 9 hrs.

Biochemistry MAJOR DEGREE BIOCHEMISTRY MACT

The Master of Arts in College Teaching program is administered by an interdepartmental committee composed of one representative from each of the following departments: Biochemistry, Botany, Microbiology and Zoology. Inquiries regarding the program should be addressed to the chairperson of the committee.

The admission requirements are:

1. Bachelor's degree with satisfactory record.

2. Nine quarter hours of college mathematics.

3. Twelve quarter hours of physical sciences.

4. Twelve quarter hours of general biology, general botany, or general zoology.

5. Eighteen quarter hours of advanced biology courses.

Requirements for the degree: All candidates for the MACT degree in Biology will meet a minimum distribution of graduate and undergraduate courses as follows:

- Eight quarter hours in each of the following:
  - a. Taxonomy and/or Ecology.
  - b. Morphology, Developmental Biology and/or Anatomy.
  - c. Physiology and/or Biochemistry.
  - d. Genetics, Cytology and/or Cytogenetics.

- Eighteen quarter hours of advanced biology credit in each of two of the following four fields: biochemistry, botany, microbiology, zoology or 36 quarter hours of advanced credit in any of the four fields as specified by the interdepartmental committee administering the MACT program in Biology.
3. At least 21 quarter hours of course work in requirement 2 (not including special projects and thesis) numbered at the 5000 or 6000 level.

4. At least 15 quarter hours of Master's research and an acceptable thesis.

5. Total graduate credit in the biological sciences (or appropriate supporting fields) of 57 quarter hours (including that in items 1, 2, 3, and 4).

6. A three-quarter, 1-hour seminar (or seminar series) on the problems and techniques of college teaching.

7. Six quarters of part-time, supervised college-teacher-internship training.

8. A final comprehensive oral examination covering the thesis endeavor and the subject matter of the course requirements.

**Botany**

**MAJOR**

**DEGREES**

**Botany**

M.S., Ph.D.

**Professors:**


**Associate Professors:**


**Assistant Professors:**


The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, bryology, cytotogy, cytogenetics, ecology, genetics, lichenology, mycology, phycology, physiology, phycology, petrology, and taxonomy.

**Requirements for admission:** In addition to the general Graduate School requirements (see page 11) the botany department also strongly recommends submitting aptitude and advanced scores from the Graduate Record Examinations, at least three letters of recommendation from academic persons, a short statement describing probable areas of interest in botany, and the following specific courses: (1) general botany or biology: 12 quarter hours; (2) advanced botany or closely allied biological sciences, 18 quarter hours; (3) physical sciences: general inorganic chemistry, 12 quarter hours, organic chemistry and physics highly recommended; (4) college mathematics, 9 quarter hours.

**General degree requirements are given on pages 19-24. Special departmental requirements include successful completion of the following.**

**THE MASTER'S PROGRAM**

**A. Thesis Program**

1. Satisfactory preparation of a written formulation and an oral defense to the student's committee of a research proposal acceptable 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 on all work offered for the degree. The department may or may not follow this examination with an oral examination.

**THE DOCTORAL PROGRAM**

1. Satisfactory presentation of a written 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 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 an examination in one modern foreign language or an A or B in French 3030 or German 3030.

5. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation).


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

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.*

**3910-20 Plants in Evolution (4, 4) Monera to anthophyta. emphasis on evolution, relationships, morphology and development. Prereq: 6 hrs in biological sciences.**

**3930 Field Botany (4) Study of plants in natural environments. Field identification, plant collection, preservation and basic ecological concepts. Prereq: 6 hrs in biological sciences.**

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

**3950 Socioeconomic Impact of Plants (3) Significance of plants in origin and development of human cultures, evolution of cultivated plants, and role of plants in present civilizations. Occasional field trips.**

**3970 Genetics and Society (3) An introduction to genetics, anthropology and evolution with emphasis on their implications for human society. (Same as Anthropology 3070.)**

**3990 Biology and Human Affairs (3) Basic biological principles involved in deterioration and preservation of an environment in which human cultures may survive.**

1310 Introductory Plant Pathology (4) (Same as Agricultural Biology 3130.)

**3210 Introductory Plant Physiology (4) Organismal physiology of plants: water relations, mineral nutrition, morphogenesis, elements of metabolic processes, effects of age, light, natural rhythms, temperature and other environmental factors. Lectures and lab. Prereq: 1 yr general chemistry and 1 yr biological science.**

4030 Mechanisms of Plant Speciation (4) Processes of plant speciation emphasizing population genetics, isolation, drift, hybridization, variation in populations, establishment of population barriers and other aspects of plant specialization. Prereq: 3010-20 and Biology 3110.


2420 Paleobotany (4) (Same as Geology 4240.)

3410 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Application of energy and matter and energy in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq: 3030 or equivalent.

5000 Thesis

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

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

5011 Mycology (4) Intensive survey of fungi, including all major orders of utilizing lecture, laboratory and field information. Occasional field trips. Prereq: 3010. 3 hrs and 1 lab.

5012 Morphology and Evolution of the Phycomycetes (4) Similar to 5000, but dealing with Phycycomycetes fungi. Prereq: 5011 or consent of instructor.

5017 Field Mycology (4) Intensive summer course on field collection and morphology of higher fungi. Frequent field trips. Prereq: Consent of instructor. May be repeated.

*Not for graduate credit for botany majors.*
5340 Plant Geography (4) Distribution of ecosys-
tems with emphasis on African types. Vegeta-
tion, climatic and historical aspects. Prereq: 4310. 2 hrs and 2 labs.

5350 Analysis of Plant Communities (4) Plants as
species and ecosystems components consid-
ered from the viewpoint of ecology, ordination,
and ecosystem function. Prereq: 4310. 2 hrs and 2 periods (field trips).

5410-20-30 Seminar in the Teaching of College
Botany (4, 1, 1) TA/Instructor, three-lecture series of gen-
eral botany. Supervised teaching in general
seminar; techniques in testing, con-
cepts, and laboratory aspects. Instructor.
Prereq: Consent of instructor. S/NC only.

5440 Seminar in Botany (1) Readings and dis-
cussions of current literature and/or selected
topics in biological research. May be repeated.
Maximum 12 hrs. S/NC only.

5510-20-30 Systems Ecology (3, 3, 3) 5510—
Nature of ecological systems. System state and
change of state. Elementary network concep-
tions of ecosystem. Prereq: 4310 or Zoology 4240; last
quarter general mathematics or equivalent. 5520—
Flow of energy and materials in ecosystems. Analog
computation, application to multicompart-
mental exchanges. Advanced network concepts.
Prereq: 5510 or consent of instructor.

Prereq: 5510. 5530—Development, dynamics
and disruption of ecosystems. Statistical modes of
communication and analysis of digital computers in simula-
tion and data-processing. Prereq: 5510.

5780 Plant Cytology (4) Intensive consideration of
structure, function and function, with emphasis on correlation where possible
of ultrastructure, biochemistry and function of sub-
cellular organelles. Principles and application of various ana-
lytical and electron microscopic tech-
niques, cell fractionation and isolation of sub-
cellular components; differentiation and anal-
lytical centrifugation; photomicrography and
microcinematography. Intended for graduate students in the biological sciences. 2 hrs and 2 labs.

5810 Cytogenetics (4) Changes in chromosomes and
genetic with relation to mutations, hybridiza-
tion, speciation, and phylogeny. Prereq: Biology 3110; 5780, or Zoology 4310. 2 hrs and 2 labs.

5820-21-22-23-24 Methods and Instrumentation
in Laboratory Investigation (1, 1, 1, 1) Laboratory
course providing project experience and theo-
retical background in various research methods. In-
xchange-exams, adsorption spectrometry, dis-
ting molecular energies of subcellular and
ultra centrifugation, gel chromatography, auto-
matic analyzers, microscopy, culture methods,
use and detection of radioisotopes, and others.
Prereq: Course in plant physiology, Chemistry
3211-21-31 or equivalent, Physics 2210-20-30 or
equivalent. S/NC Only.

5830 Field Methods in Plant Ecology (4) Analysis
of plant communities and environments, includ-
ing field experience. Prereq: 4310, 5340, 5350. 2 hrs and 2 periods (field trips).

5850-51-52-53-54 Methods and Instrumentation
in Field Investigations (1, 1, 1, 1, 1) Intensive field
work using appropriate methods and instrumen-
tation. Topics vary according to needs of stu-
dents. May be repeated with consent of instruc-
tor. S/NC Only.

5870 Experimental Plant Genetics (4) Genetics of
plants stressing molecular aspects and includ-
ing mechanisms of gene action, controlle-
telements, transduction, genetic inheritance,
and adaptation. Prereq: Biology 3110 and Chem-
istry 3231. 3 hrs and 1 lab.

5910-20 Developmental Plant Morphology (3, 1)
Developmental aspects of angiospermic tissue
aspect of phenomena of morphogenesis-correla-
tions, polarity, symmetry, differentiation, regen-
eration, and regeneration, growth, and genetic factors. Prereq: 5410-20 or 4142, and 5210 or 5210 for 5910; 5910 for
5920. 2 hrs and 1 lab for 5910, 1 lab for 5920.

6000 Doctoral Research and Dissertation

6010 Advanced Topics in Morphology of Vascular
Plants (2-4) Needs of students determine con-
tent. Topics selected from systems of experi-
mental anatomy, morphology, and topo-
geneesis. Prereq: 3020-30, 4120, 5010-20 or con-
sent of instructor. Required of teaching as-
sistants. Maximum 12 hrs. S/NC only.

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

6210 Photobiology (3) Interaction of nonionizing
radiation with living systems. Prereq: Physics
2110-20-30 or equivalent. Biophysics 4110.

6310 Advanced Topics in Cytology and Cell Biol-
ogy (2-3) Requirements and interests of stu-
dents determine topics, such as actions of
chemicals on actively dividing cells; and
ultrastructural research in selected cytoplasmic
organelles and cellular systems, experimental
cytology, cellular control of nuclear acid biosyn-
thesis. Prereq: 5780 or Zoology 4310; Biology
3110; Biochemistry 4110-20. May be repeated
with consent.

6320 Ecosystems of the World (3) Classification
and characterization of world's regional ecosys-
tems. Interrelations of climate, topography,
sounds, vegetation, and fauna. Prereq: 5340.

6420 Advanced Topics in Genetics (2-4) Literature
survey of selected areas in genetics. Prereq:
Biology 3110; Biochemistry 4110-20. May be repeated with consent.

6520 Seminar in the History of Botany (2)

6820 Advanced Topics in Plant Physiology (4)
Requirements of student determine content, in-
cluding growth and growth hormones; minor ele-
ment nutrition; photoperiodism; radiation ef-
effects. Prereq: 5210; 1 yr college physics. May be repeated with consent.

6830 Advanced Topics in Ecology (2-4) Needs of
students determine content, including community
analysis; biogeochemistry; bioclimatology;
and system ecology. Prereq: 4310, 5340, 5350. May
be repeated with consent of department.

6930 Advanced Topics in Systematic Botany (2-4)
Needs of student determine content, such as
morphology and evolution of vascular plants;
biosystematics (systematic literature and code
of nomenclature); experimental taxonomy; cur-
rent research in systematics; systems of clas-
sification. Seminars or lectures and labs depend-
ing on subject. Prereq: 5210. May be repeated with consent of department.

Chemistry

MAJOR

DEGREES

Chemistry

M.S., MACT, Ph.D.

Professors:

D. A. Shirley (Head), Ph.D. Iowa State;
K. N. Bowman, Ph.D. Princeton; C. A. Buehler
(Emeritus), Ph.D. Ohio State; W. E. Bull, Ph.D.
Illinois; C. J. Collins, Ph.D. Northwestern;
J. A. Dean, Ph.D. Michigan; J. F. Eastham,
Ph.D. California (Berkeley); W. H. Fletcher,
Ph.D. Minnesota; C. V. Bauer, Ph.D. Texas;
C. D. Kleinfelter, Ph.D. Princeton; J. W. Larsen,
Ph.D. Purdue; M. L. Glatzke, Ph.D. Wisconsin;
G. D. Larrabee, Ph.D. Louisiana State;
A. D. M. L. Venken, Ph.D. Pennsylvania State;
D. G. O. Kelcey, Ph.D. California (Berkeley); K. G. Schwalb, Ph.D. Illinois;
H. A. Smith (Emeritus), Ph.D. Harvard;
W. L. Smith (Emeritus), Ph.D. University of
W. A. Van Nooey, Ph.D. Johns Hopkins;
E. C. Wehrly, Ph.D. Princeton, Ph.D.
London; J. H. Wood (Emeritus), Ph.D. North
Carolina.

*Alumni Distinguished Service Professor.
THE MASTER'S PROGRAM

The department offers a specialization in seven areas for the M.S. degree: analytical chemistry, environmental chemistry, 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 make an overall total of 45 hours.

These additional hours must include one of the following sequences: 5110-20-29-30, 5250-59-60-69-70-79, 5340-50, 5410-20-30, 5710-20-30.

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

5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers specialization in nine areas for the Ph.D. degree: analytical chemistry, physical chemistry, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, chemical physics, and theoretical chemistry.

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

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

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

3. Participation in seminar (5911-21-31) during the entire period of graduate study.

4. Thirty-nine hours of additional graduate course work including at least 6 hours at the 6000 level. For emphasis in environment or energy, these additional courses must include Chemistry 5220, 5250-59-60-70-79, Ecology 5310, Environmental Engineering 4030, plus selected courses from other areas of chemistry, environmental engineering, meteorology, microbiology, health physics, ecology, computer science, statistics, and industrial hygiene.

For emphasis in energy, these additional courses must include Chemistry 5410, 5610-20-30, 5810, Geology 5810, Mechanical Engineering 4180, plus other course selections from areas such as catalysis, heterogeneous equilibria, kinetics, thermal sciences, combustion and propulsion engines, resource economics, nuclear engineering, and electrical engineering. All course selections must be approved by the appropriate departmental committee.

5. A comprehensive advanced examination.

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

7. A final oral examination.

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

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

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

3. An examination on the basic principles of mechanics, electricity, and magnetism.


5. The requirements listed in items 3, 5, 6, and 7 above.

6. The program in chemical physics is conducted jointly with the Physics Department which offers the same degree.

7. A final oral examination.

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

1. Research and a dissertation on a subject related to the Ph.D. degree in Chemistry with specialization in polymer science. This dissertation must include Chemistry 5220, 5250-59-60-70-79, Ecology 5310, Environmental Engineering 4030, plus selected courses from other areas of chemistry, environmental engineering, meteorology, microbiology, health physics, ecology, computer science, statistics, and industrial hygiene.

For emphasis in energy, these additional courses must include Chemistry 5410, 5610-20-30, 5810, Geology 5810, Mechanical Engineering 4180, plus other course selections from areas such as catalysis, heterogeneous equilibria, kinetics, thermal sciences, combustion and propulsion engines, resource economics, nuclear engineering, and electrical engineering. All course selections must be approved by the appropriate departmental committee.

8. A final oral examination.

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

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

11. A reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

12. A final oral examination.

13. The requirements for the Ph.D. degree in Chemistry with specialization in environment or energy consist of the satisfactory completion of:

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

2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
requires satisfactory completion of:
1. Research and a dissertation to give at least 36 hours of graduate credit and 6000.
2. Chemistry 4160-70, 5531, 5140-50, 5160 or 5170, Polymer Engineering 4910.
3. Participation in Chemistry Seminar (3911-21-31) and the Polymer Seminar (3918) the entire period of graduate study.
4. Thirty hours of additional graduate course work, including at least 6 hours at the 6000 level; 3 hours from the Department of Chemistry offerings.
5. A comprehensive advanced examination in polymer science.
6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
7. A final oral examination.

*3211-21-31 Organic Chemistry (3, 3, 3) Comounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Must be taken in sequence. Prereq: 1160-70. Coreq: 3129-29-39 is a correq for students not having credit for the laboratory.

*3219-29-39 Organic Chemistry Laboratory (1, 1, 1) Experiments on topics discussed in 3211-21-31. Coreq: 3211-21-31 is a correq for students not having credit for the lecture.


*3429-39 Physical Chemistry Laboratory (1, 1) Gases, liquids, chemical equilibria, solutions, phase equilibria, reaction kinetics and electrochemistry. Prereq or coreq: 3420-30. 1 lab.


*3529-39 Organic Chemistry Laboratory (1, 1) Experiments on topics discussed in 3221-21-31. Correq: 3221-21-31 except designed for students who have need for operating knowledge of various spectroscopic and chromatographic techniques. Corresponding lecture (3521-31 or 3221-31) is coreq for students not having credit for the lecture.

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


4119 Physical Chemistry Laboratory (1) Solutions, phase equilibria, reaction kinetics and spectroscopy. The corresponding course 4110 is coreq.

4160-70 Intermediate Physical Chemistry (3, 3) (Designed for entering graduate students who have had one year of physical chemistry.) 4160—The three laws of thermodynamics, phase equilibrium and chemical equilibria; Gases and kinetic theory, chemical kinetics, molecular spectroscopy, and introduction to chemical statistical thermodynamics. 4210 Advanced Analytical Chemistry (3) Chemical separations including chromatography, ion exchange and solvent extraction; spectrophotometric techniques. Analytical chemistry. Recommended: 3420 or 4820.

4220 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4220. Coreq: 4210.

4240 Physical Inorganic Chemistry (3) Theoretical concepts leading to an understanding of inorganic chemistry; quantum theory of the atom, principles of molecular structures, and elements of electronic structure. Coreq: 4110. Coreq: 4910-20-30 Biophysical Chemistry (3, 3, 3) Application of theoretical concepts to inorganic elements, their chemical states, and their reac- tions. Prereq: 4240.

4510 Organic Qualitative Analysis (3) Identification of organic compounds and mixtures. Prereq: 3211-21-31, 3219-29-39 or 3219, 3529-39. 3 labs. Open to students who have completed 4610.

4550 Organic Reaction Mechanisms (3) Prereq: 1 yr of organic chemistry.

4610-20 Advanced Chemical Experimentation (2, 2) Laboratory course in application of modern experimental techniques to solution of chemical problems. Synthesis and characterization of organic and inorganic compounds with emphasis on independent study using advanced techniques. Prereq: 3231-39 or 3531-39, 3430-39, 4220, 4610 not open to students who have completed 4510.

*4910-20-30 Biophysical Chemistry (3, 3, 3) Physical chemistry of biological systems. Prereq: 3219-29-39 or 3219, 3529-39 as a correq; latter is recom- mended.

*5259-60-70 Organic Chemistry Laboratory (1, 1, 1) Experiments in use of chemical techniques. Prereq: 5259-60-70 or consent of instructor.

*5269-79 Advanced Analytical Chemistry Laboratory (1, 1) Ions, solvents and emission spectroscopy, structure elucidation by IR, NMR, UV, and mass spectra. 5260—Chemical separation methods; solvent extraction, chromatography, electrophoresis; radiochemical methods; fluorescence; x-ray methods; 5270—Electroanalytical, mass spectrometric, and thermal analytical methods; on stream and automatic analysis. Prereq: 1 yr of physical chemistry.

5299-69-79 Advanced Analytical Chemistry Laboratory (1, 1) Ions, solvents and emission spectroscopy, structure elucidation by IR, NMR, UV, and mass spectra. 5260—Chemical separation methods; solvent extraction, chromatography, electrophoresis; radiochemical methods; fluorescence; x-ray methods; 5270—Electroanalytical, mass spectrometric, and thermal analytical methods; on stream and automatic analysis. Prereq: 1 yr of physical chemistry.

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

5350 Quantum Chemistry (3) Electronic excited states and introduction to group theory; perturbation theory; reactivity of organic molecules. Prereq: 5340.

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


5511 Survey of Inorganic Chemistry (3) Atomic structure, wave mechanical atoms, ionic and covalent bonding, quantum mechanics, chemical reactions, reaction mechanisms, inorganic stereochemistry, coordination chemistry, and descriptive chemistry of the elements.

5521 Survey of Analytical Chemistry (3) Volu- metric and gravimetric analysis, acid-base, oxidation-reduction, complexation and precipitation equilibria; spectroscopic, electroanalytical, and separation methods.

5531 Survey of Organic Chemistry (3) Bonding in organic molecules, chemistry of hydrocarbons, alicyclic compounds and conformational analysis, nonmonofunctional derivatives, carboxylic acids, alicyclic compounds, stereochemistry, aro- matics, and spectral analysis of organic molecules by infrared, ultraviolet, nuclear magnetic resonance and mass spectral techniques.

5550 Industrial Chemical Research (3) Practice of modern industrial research taught by case studies and via presented research. Course content varies, selected to illustrate good past and current industrial research prac- tices. Coreq: Completion of a 4000 chemistry course sequence.

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

5710-20-30 Theoretical Inorganic Chemistry (3, 3, 3) 5710—Nature of chemical bonding; ionic, covalent, and metallic. 5720—Ligand-field theories, coordination compounds. 5730—Investigational methods of structural inorganic chemistry. Prereq: 1 yr of physical chemistry.

5810 Nuclear Chemistry (3) Nuclear properties, radioactive, nuclear decay processes, nuclear structure and models, nuclear reactions, radiation and matter, radiation detection. Prereq: One of 6100-6200.

5911-21-31 Chemistry Seminar (1, 1, 1) Discussion of departmental research, current research literature and general topics. May be repeated. Registration required each quarter except summer resident graduate students. S/NC only.

6000 Doctoral Research and Dissertation

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

6130 Natural Product Chemistry (3) Structure, chemistry, and synthesis of naturally occurring substances of biological or environmental significance. Course content varies 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-Hoffman 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 intramolecular reactions of alkenes, ketones, dienes, diynes, aromatic compounds, and other photoactive species. Prereq: Two of 5110-20-30-35.


6210 Advanced Analytical Spectroscopy (3) Newer methods of spectroscopic analysis, including: transform methods, lasers in spectroscopy, fiber optics, introductory nonlinear optics, and spectroscopic techniques for remote sensing. Prereq: 5250.

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance: environmental chemistry, spectrophotometry, modern liquid chromatography, new electroanalytic methods, bioanalytical methods, and minicomputer and microprocessor applications in chemical instrumentation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6311 Selected Topics in Polymer Chemistry (3) Subject matter varies among important topics of current significance. Editorial methods, multiprocessor techniques, nuclear models, synthesis of naturally occurring monomers. Prereq: 5140 or two of 5110-20-30-35.

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5410-20-30-50, 5340-50. May be repeated.

6420 Nuclear Magnetic Resonance (3) Theory of nuclear magnetic resonance spectroscopy with emphasis on high-resolution methods. Applications to problems in molecular structure and behavior. Prereq: 5110-20-30-35.

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes pursuant to excitation of molecules by photons, electrons, multiphoton processes and uses of laser sources; fluorescense and phosphorescence; radiationless transitions as studied by optoacoustic spectroscopy; chemical reactivity of excited states; ion-molecule and free radical reactions; electron capture and electron-transfer processes. Prereq: 5430.

6540 Electrochemistry (3) Electrical double layer; electrode kinetics; transport properties of electrolytes; electroanalytical methods. Prereq: 5430 or 5270.


6480 Statistical Thermodynamics (3) Application of statistical mechanical methods to systems of chemical interest such as isotope effects on equilibria and rate processes, phase equilibria, condensation phenomena. Prereq: 5410, 5450.

6485 Advanced Chemical Kinetics (3) Kinetics of elementary chemical reactions at molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces; reactions cross-sections, "direct" vs "complex" modes of reaction, photofragmentation, energy partitioning, 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 thermodynamic properties; selected topics from literature. Prereq: 5410.

6520 Magnetic Resonance (3) Principles of magnetic resonance spectroscopy underlying nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq: 5430.

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

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 collision processes.) Recent theories of chemical reactivity. Prereq: 5340-50.

6750 Molten Salt Chemistry (3) Structure, spectroscopic properties, solution thermodynamics, electrochemistry and phase equilibria of molten salts. Solutions in molten salts. Prereq: 4110 and 5410 or equivalent.

6810 Vibrational Problems in Molecular Spectra (3) (Same as Physics 6810.)

6811 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance. Nuclear decay schemes, nuclear models, nuclear reaction theory, nuclear detection techniques, activation analyses. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6820 Molecular Vibration-Rotation Theory (3) (Same as Physics 6820.)

Classics

Professors: H. C. Rutledge (Head), Ph.D. Ohio State; A. Rapp (Emeritus), Ph.D. Illinois.

Associate Professors: M. K. Harmon, Ph.D. Arkansas; J. E. Shelton, Ph.D. Ohio State.


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

Greek

3010 Plato (3)

3020 Herodotus (3)

3030 Euripides (2)

3040 Aeschylus, Sophocles (3)

3060 Lysias (3)

3040 Aristophanes (3)

3060-90-70 Directed Readings in Greek (3, 3, 3)

Latin

3440 Livy (3)

3450 Pliny and Martial (3)

3460 Elegiac Poets (3)

4120 Horace, Satires and Epistles (3)

4310 Selected Readings From Latin Literature (3)

4320-30 Selected Readings from Latin Literature (3, 3) May be repeated.

4340 Horace, Odes (3)

3450 Tacitus (3)

3460 Lucretius (3)

3470 Readings in Medieval Latin (3)

4310-40-30 The Latin Epic: Lucretius, Vergil, Lacon (3, 3, 3)

5510-20-30 Roman Comedy: Plautus, Terence (3, 3, 3)

GENERAL COURSES

3210 Early Greek Mythology (3) Comprehensive study of Greek myths through readings, lectures, and discussion with emphasis on significance for Greek thought and religion. Slides and tapes illustrate influence of Greek myths on art, music, and literature of ancient Greek and later cultures. (Same as Religious Studies 3210.)

3220 Greek Mythology in the Classical Period (3) A study of use of myth in literature, history, religion, philosophy, and art of Classical Age of Greece, and change of attitude toward myth from earlier periods. Familiarity with basic Greek myths is assumed. Readings, lectures, slides, and discussion. (Same as Religious Studies 3220.)

3230 Roman Mythology (3) Study of myths created by Romans, as well as those the Romans borrowed from Greeks, with reference to Roman attitude toward history, religion, and society. Readings, lectures, slides, and discussion. (Same as Religious Studies 3230.)
Computer Science

MAJOR

Computer Science

DEGREE

M.S.

Professors:
R. T. Gregory (Head), Ph.D. Illinois
F. Donaldson, Ph.D. Florida (Electrical Engineering)
P. D. Auburn (Mathematics); G. R. Sherman, Ph.D. Purdue (Director of Computing Center).

Associate Professors:
R. M. Aukes, Northwestern; T. Feagin, Ph.D. Texas (Aerospace Engineering); P. R. Gonzalez, Ph.D. Florida (Electrical Engineering); E. L. Hall, Ph.D. Missouri (Electrical Engineering); C. E. Hughes, Ph.D. Pennsylvania State; K. C. O'Kane, Ph.D. Pennsylvania State; S. M. Seikow, Ph.D. Pennsylvania; M. G. Thomasor, Ph.D. Duke.

Assistant Professors:
A. Chau, Ph.D. SUNY (Buffalo); S. R. Jordan, Ph.D. Wisconsin; J. M. Moschel, Ph.D. Ohio State; C. P. Pfleeger, Ph.D. Pennsylvania State; D. W. Straifht, Ph.D. Texas.

Instructor:
C. W. Thompson, M.A. Texas.

ENTRANCE REQUIREMENTS TO M.S. PROGRAM

Upon admission to the Graduate School, students who wish to enter the Master's degree program in Computer Science should have the following background:
1. Mathematical maturity at least equivalent to that of a student who has completed the calculus sequence through one year of multivariable calculus and matrix algebra.
2. Computer Science 3150 or an equivalent introductory numerical algorithms course.
3. An introduction to probability and statistics at least at the level of Statistics 3450.
4. Computer Science 3715 or an equivalent introductory course in discrete structures and logical foundations of computer science.
5. Computer Science 3510 and 3520 or equivalent courses in advanced FORTRAN programming, machine organization and assembler language programming.

THE MASTER'S PROGRAM

All students must receive departmental credit for or exhibit proficiency in the following courses:
1. Computer Science 4550 and 4510
2. Electrical Engineering 5615-25-35
3. One of the three courses Computer Science 4710, 4035, or 4225.

The student may then select either Plan A or Plan B.

Plan A: Thesis Option
1. Complete 36 hours of courses at the 4000 level or above, including at least 18 hours at the 5000 level, exclusive of Electrical Engineering 5615-25-35.
2. Complete at least 9 additional hours of thesis credit, Computer Science 5000.
3. Pass an oral examination by a committee of at least three faculty members.

Plan B: Non-Thesis Option
1. Complete 45 hours of courses at the 4000 level or above, including at least 27 hours at the 5000 level, exclusive of Electrical Engineering 5615-25-35.
2. Pass written and oral comprehensive examinations.

Under either plan, courses which are taken from a department other than Computer Science must have the approval of the Computer Science faculty.

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 not both be taken as assembly language programming, 3150 or 3155 should take 3155. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3150.)

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. 3150 and 3155 may not both be taken for credit. Students with no knowledge of FORTRAN should take 3150. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3155.)

3500 Computer Organization and Programming I (3) Problem formulation and advanced programming FORTRAN-oriented. Prereq: 4050 or digital computers. Prereq: 1510, 2510, 3150, or consent of instructor.

3520 Computer Organization and Programming II (3) Master assembly language programming, elementary computer architecture, interpretation of memory dumps. Prereq: 3510 or equivalent.

3570 Programming Languages (4) Comparison and analysis of programming languages and their features. Languages to be discussed will include SNOBOL, LISP, APL, and PASCAL. Prereq: 2510.

3715 Discrete Structures (3) Introduction to discrete structures useful in computer science. Sets, set logic, Relations, functions. Proof techniques, induction, logic, Graphical representations and algorithms. Prereq: 1510 or 1610 or 3150 or equivalents. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3715.)


4225 Numerical Solution to Equations and Numerical Approximations (3) (Same as Mathematics 4225.)

4235 Numerical Methods for Ordinary Differential Equations (3) (Same as Mathematics 4235.)

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

4310 Computation in Statistical Analysis (3) Use of digital computer in standard statistical analyses, such as frequency tabulations, percentages, and data reduction, correlation and regression analyses of variance. Not for credit for Computer Science majors. Prereq: Statistics 2100 or equivalent. An elementary knowledge of a programming-oriented language such as FORTRAN is also assumed.

4330 Independent Study in Computer Science (1-3) Special project in area of student's primary interest. To be arranged by Computer Science faculty, perhaps jointly with student's faculty advisor. Prereq: Consent of instructor. May be repeated. Maximum credit is 6.

4510 Data Structures and Nonnumeric Programming (3) Data structures and algorithms for their manipulation. Arrays and orthogonal lists; stacks, queues, rings, doubly-linked lists, trees, dynamic storage allocation; organization of files, programming languages for information structures. Prereq: 3500. Prereq or coreq: Knowledge of SNOBOL equivalent to that gained in 3570.
4550 Computer Organization and Programming III (3) Programming, organization and advanced pro-
gramming. Machine language and design of com-
puters, representation of information, micro-
programming, memory, instruction set, interrupt
systems, interpreters, macro-assemblers. Prereq:
3520 or equivalent.
4610 Operating Systems—Concepts and Facili-
ties (3) Study of operating systems; design, im-
plementation, and development of computer sys-
tems. Memory, processor, device, and data
management. Interrupts, machine-level output
parameters and relocation, device character-
istics, data set organizations, SPOOLing. Prereq:
4510 and 4550.
4620 Operating Systems—Case Studies (3) Alter-
natives in operating system design, dynamic
recovery, paging, segmentation, time sharing,
time slicing, protection, concurrency, real time
systems. Examples from different operating sys-
tems and as appropriate. Prereq: 4610 or equiva-
lent or consent of instructor.
4660 Compiler Construction (3) Practical expe-
dience with design of compilers. Scanning, pars-
ing, semantic processing, code generation and
optimization, error detection and correction. Term
project includes a complete compiler for a small
language. Prereq: 4510 and 4550.
4710 Formal Languages and Automata (3) Gram-
mars of Chomsky hierarchy and their recognizers.
Properties of languages and machines. Empha-
sis on regular and context-free languages. Introdu-
tion to computability and enumerability. Prereq:
3715.
4730 Analysis of Nongeneric Algorithms (3) Study
of efficient algorithms for searching (e.g., binary
search, trees, hash coding) and sorting (e.g.,
heap sort, Shell's sort, quick-sort). Algorithms for
other non-numeric applications, such as pattern
matching, graph path detection, set operations. Precise
time and space complexity. Polynomial complete
problems. Prereq: 4510 and 4550.
4750 Interactive Computer Graphics (3) Point
plotting, vector generation, interactive graphical
techniques, two- and three-dimensional transfor-
mations, hidden surface algorithms, hidden line elimi-
nation, 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 computer pro-
gramming, or consent of instructor. (Same as
Geography 4750.)
4820 Introduction to Pattern Recognition (3)
(Same as Electrical Engineering 4820.)
4830 Digital Image Processing (3) (Same as
Electrical Engineering 4830.)
4850 Small Computer Systems (3) (Same as
Electrical Engineering 4850.)
4910 Analysis and Management of Computer
Installations (3) Analysis and design of computer
systems; implementation, justification, person-
nel, systems re-organization and perspective on system. Prereq:
3520 or equivalent.
4950-90 Special Topics in Computer Science (1-4, 1-4) Credit determined at registration. Prereq:
Computer Science staff. May be repeated with consent of department. Maximum 9 hrs.
5000 Thesis
5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not other-
wise completing theses degree. Students must have
a student uses university facilities and/or faculty
time before degree is completed. May not be used
towards degree requirements. May be repeated.
S/NC only.
5010 Computer-assisted Instruction (3) History
and development of CAI systems. Emphasis on
strategies or such systems and their future role in the
future role of CAI in education. Use of a CAI
programming language to implement a CAI
course. Prereq: 3510 or consent of instructor.
Economics
See College of Business Administration.

English

MAJOR

DEGREES

English

M.A., M.A.C.T., Ph.D.

Professors:

J. D. Leonard (Head), Ph.D. Princeton;

E. W. Brafton (Associate Head), Ph.D. Illinois;

P. G. Adams (Director of Graduate Studies), Ph.D. Texas; K. Curry, Ph.D. Yale;


B. L. Leggett, Ph.D. Florida, J. E. Reese (Chancellor), Ph.D. Kentucky; N. J. Sanders, Ph.D. Shakespearian Studies, Stratford-Upon-Avon; J. Schneider, Ph.D. Northwestern;


Associate Professors:

L. H. Burghardt, Ph.D. Chicago; D. A. Carroll, Ph.D. North Carolina; B. K. Dumas, Ph.D. Arkansas; A. R. Earner, Ph.D. Indiana;

B. J. Gaines, Ph.D. Wisconsin; J. E. Gill, Ph.D. North Carolina; R. B. Miller, Ph.D. Brown;

D. A. Myers, Ph.D. Indiana; A. R. Parmar, Ph.D. Colorado; F. K. Robinson, Ph.D. Texas.

Assistant Professors:

J. A. Armistead, Ph.D. Duke; R. D. Cox, Ph.D. Mississippi; D. G. Glaive, Ph.D. Yale;

N. M. Goalen, Ph.D. Yale; T. J. A. Hefferman, Ph.D. Chicago; M. A. Long, Ph.D. Pennsylvania;

C. J. Meland, Ph.D. Michigan; V. C. Martin, Ph.D. Tennessee; M. L. Prays, Ph.D. California (Santa Cruz); M. P. Richards, Ph.D. Wisconsin.

Visiting Lecturers:

W. Dykesman, B.A. Northwestern; G. Griffiths, Ph.D. Vanderbilt.

Detailed information about the Master's and doctoral programs, and about individual graduate courses, may be obtained by writing the Director of Graduate Studies of English, McClung Tower. For admission forms, write to the Graduate School.

THE MASTER'S PROGRAM

The departmental requirements for the M.A. degree in English include (1) thesis and 36 quarter hours of courses in the Department of English or 45 quarter hours without a thesis, (2) evidence of proficiency in one foreign language, and (3) a final examination. The courses should include 12 hours at the 6000 level, 12 hours of additional courses at the 5000-6000 level, and 12 hours at any level for graduate credit, including the 3000-4000 level.

For the degree of Master of Arts in College Teaching (M.A.T.) the requirements include (1) 45 quarter hours of courses in English, arranged as for the non-thesis M.A., (2) 2 hours in a special course designed for M.A.T. students, (3) 3 hours of a tutorial in the teaching of freshman composition, (4) a thesis or 9 additional quarter hours of 5000- and/or 6000-level courses in English, (5) evidence of proficiency in one foreign language, (6) a final examination, and (7) a program of supervised teaching approved by the department.

THE DOCTORAL PROGRAM

The departmental requirement for the Ph.D. degree in English is completion of a minimum of three academic years of resident graduate study. This includes a balanced program of at least 72 quarter hours (or the equivalent in English): 36 hours at the 6000 level; 24 additional hours at the 5000-6000 level; and 12 hours for graduate credit at any level, including the 3000-4000 level. In addition, 9 (or 8) hours approved by the department must be taken for graduate credit in a subject or subjects other than English. Normally a student with the M.A. from another university may transfer at least 36 quarter hours.

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

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

*1211 Written and Oral English for Foreign Students (6) Rapid review of English grammar and on paragraph writing. 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 foreign students.

*1221 Written and Oral English for Foreign Students (6) Emphasis on the more advanced structures of English grammar and on paragraph writing. Required during the first quarter of residence of foreign students who on the English Proficiency Examination demonstrate need for work in English structure, but not at the intensive level of English 1211. Required also of foreign students who complete 1211.

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

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


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—1900 to 1835. 3220—1835 to 1900.

3241-12-30 Modern Drama (3, 3, 3, 3) 3241—Continental to 1930, 3242—Continental since 1930. 3420—British, 3430—American. (Graduate credit normally limited to students in Speech and Theatre.)

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

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

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

3580 Restoration and Eighteenth-century Poetry (3) Emphasis upon Dryden and Pope.

3620 Restoration and Eighteenth-century Drama (3) Dryden through Sheridan.

3630 Restoration and Eighteenth-century Prose (3) Defoe, Addison, Steele, Swift, and others.

3700 The Age of Johnson (3)

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


3721 Introduction to Folklore (3) Essential terms and concepts in modern folklore-tolk life studies. Emphasis on North American materials: folklore, folksong, myth, legend, proverb, riddles, superstitions, dance, games, and architecture.

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

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

4010-20 Shakespeare (3, 3) 4010—Early plays, c. 1500-1601, including Henry IV, Twelfth Night, and Hamlet. 4020—Later plays, 1601-1613, with emphasis upon tragedies and dramatic romances.

4042-43 Topics in Mode and Genre (3, 3) Content varies. Special topics in principal forms and modes of British and American Literature: folk-tale, folksong, myth, legend, proverb, riddles, superstitions, dance, games, and architecture.

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, and Kennedу, and major figures to 1875. 4060—Henry James and Mark Twain through early works of Faulkner and Hemingway. 4070—Early thirties to present.

4140-50 Technical Writing (3, 3) 4140—For students planning careers in physical, life and health sciences, engineering, agriculture, and forestry. Writing of proposals, laboratory and personal reports, abstracts and journal articles. 4150—Writing of scientific feature articles in which data are marshalled and analyzed for human interest.

4250 Advanced Fiction-Writing (2) Further development of skills acquired in basic Writing Fiction course. Prereq: 3450 or consent of instructor.

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

4258 Writing Science Fiction and Fantasy (3) Survey of general canons and the basic texts of Science Fiction, Speculative Fiction and Fantasy. Exercises in writing in genres, in accordance with techniques learned in basic Writing Fiction course.

4270 Advanced Poetry Writing (2) Further development of skills acquired in basic Writing Poetry course. Prereq: 3470 or consent of instructor.

4310-20-30-40 British Novel (3, 3, 3, 3) 4310—Defoe to Jane Austen. 4320—Scott to Thackeray. 4330—George Elliot to Galsworthy. 4340—James Joyce to present.

4440 Sociolinguistics (3) Exploration of language patterns in social interactions between them and their social context. Examination o
4455 Varieties of English (3) Theories, methodology, and implications for teaching English as a second or foreign language. Prereq: 3340 or consent of instructor.

4450 Dialectology (3) Theories and methodology of research, fieldwork and analysis. Prereq: 3340 or consent of instructor.

4455 Varieties of English (3) Theories, methodology, and implications for teaching English as a second or foreign language. Prereq: 3340 or consent of instructor.

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

4471-81 English as a Second or Foreign Language (3, 3) 4471-Applied linguistics in teaching and learning of English as second or foreign language. Prereq: 3330 or consent of instructor. 4472-31-41 Ballad and Folktales (3, 3, 3) 4471-Study of traditional English and Scottish popular ballads and their North American variants. 4472-Study of native American ballad and folk tales; 4473-Study of the folk narrative: functions, categories, and patterns of storytelling.

4860 Seventeenth Century Prose and Poetry (3) Bacon and Donne to Marvell.

5100-20-30 Readings in American Literature (3, 3, 3) For students who know Old English well and are interested in investigating its history and development. Prereq: 5150, 6140.

5210-20-30 Readings in American Literature from Colonial Period to the Present (3, 3, 3) 5240 Readings in Black American Literature (3) Critical analysis of poetry, prose, drama, criticism, historical and cultural background; discussion of relevance or irrelevance of race as influence on text and reader. 5310 Rhetoric and Composition: Theory and Practice (3) Concentration on stylistics and types of expository writing. 5410-20 Readings in Middle English Literature (3, 3) 5510-20 Readings in Literary Criticism from Plato and Aristotle to the Present Day (3, 3) 5610-20-30 Readings in English Literature of the Nineteenth Century (3, 3, 3) 5710-20-30 Readings in English Literature of the Eighteenth Century (3, 3, 3) 5810-20-30 Readings in English Literature of the Renaissance (3, 3, 3) 5850 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, history of literature, and methods of research, including collecting of information, evaluation of material, and transmitting results of scholarship.

5860 Textual Bibliography and Criticism (3) Study of evidence gathered from printing process to make critical judgments about text of literary work. Prereq: 5860 or consent of instructor.

6810-20-30 Studies in Twentieth-century Literature (3, 3, 3) 6680 Textual Bibliography and Criticism (3) Study of evidence gathered from printing process to make critical judgments about text of literary work. Prereq: 5860 or consent of instructor.

French

See Romance Languages

Geography

MAJOR

DEGREES

M.S., Ph.D.

Professors:

S. R. Jumper (Head), Ph.D. Tennessee; S. R. Jumper (Head), Ph.D. Tennessee;

T. E. Egger, Ph.D. Northwestern; T. H. Schmudde, Ph.D. Wisconsin.

Associate Professors:

T. L. Beif, Ph.D. Iowa; L. W. Brikman, Jr., Ph.D. Wisconsin; J. B. Rehder, Ph.D. Louisiana State.

Assistant Professors:

J. R. Carter, Ph.D. Georgia; W. N. Cherry, M.S. Tennessee; B. Raitzen, Ph.D. Northwestern.

The Department of Geography offers the degrees of Master of Science and Doctor of Philosophy with concentrations in cartography and remote sensing (M.S. only), physical geography and human systems, urban geography, geography of Anglo-America, and rural and nonmetropolitan geography.

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours beyond completion of a sound undergraduate major program. Of these, half must be in courses numbered above 5000, in addition to thesis, and must include Geography 5150-60 and (at each offering during residency) 5100. Thesis and comprehensive examination required.

THE DOCTORAL PROGRAM

The doctoral is a research degree and is granted only to those persons who demonstrate productivity conducting independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. All Ph.D. programs must include Geography 5170 and (at each offering during residency) 5100. Other course requirements will be determined by the student's committee in accordance with specific interests and needs. A normal program contains 75 hours in courses for graduate credit and includes a minimum of 15 hours in the 6000 series. A minimum of 15 hours of graduate credit must be earned in related fields outside the department. Registration in any course in the 6000 series may be repeated for credit with the permission of the department.

Competence in one foreign language and pertinent quantitative techniques are required. The language will be French or German unless otherwise approved by the student's faculty committee. Written and oral qualifying examinations are required.

4540 Geology 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.

4610 Industrial Geology (4) Factors affecting location of manufacturing activities, with emphasis on the United States. Prereq: 3410 or consent of instructor.

4530 Geography of Agriculture (4)

4710 Cartography (4) Map construction, reproduction, projection, generalization, map drawing.

4720 Data Mapping (4) Methods for representing spatial distributions by maps and graphs. Mapable data may include phenomena as diverse as birth rates, voting patterns, and air pollution levels. Prereq: Consent of instructor.

4740 Remote Sensing: Types and Applications (4) Basic principles and uses of aerial photographic imagery for interpretation and simple mapping. Prereq: Consent of instructor.

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

5000 Thesis

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

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

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

5160 Research Design and Field Problems (4-4) Development of research problems, preparation of appropriate study designs, and practical field application. Normally offered as 4-week summer course for 6 hrs credit. Students may not take other courses or have duty assignments during this 4-week period.

5170 Geographic Concept and Method (3) Traditional and modern thought regarding nature, scope, problems, and methods of geography.

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

5250 Topics in Historical Geography (3) Examination of trends, problems and methods in historical geography. May be repeated with consent of instructor. Maximum 9 hrs.

5260 Advanced Cultural Geography (3) Geographic 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: 3860 or consent of instructor.

5310 Topics in Regional Geography of the United States (3) Intensive analysis of problems and trends in certain regions of United States, excluding American South. May be repeated with consent of instructor. Maximum 9 hrs.

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

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.
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 12 of 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 recommended. Registration in any course in the 6000 series may be repeated for credit with the permission of the department.

A preliminary examination will be both written and oral.

3. Each Ph.D. student must satisfy a research tool requirement which will be determined by his/her faculty committee and which will consist of one of the following:
   a. Demonstration by examination of a reading knowledge in one modern foreign language in which there is a significant body of Geological literature.
   b. Completion of course 3030 in an appropriate foreign language with a B or better.

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 be taken during a student's graduate program and must be approved by the student's entire committee. In no case will option C above be available unless the student has had reading training as a college undergraduate in an appropriate foreign language.

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

*3180 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen, chemical and X-ray methods of identification. Prereq: 1410, Chemistry 1110-20 or equivalent. 3 hrs and 1 lab.

*3210-20 Invertebrate Paleontology (4, 4) Systematic review of important invertebrate fossil groups. 3210-Protozoa to Brachiopoda; including sponges, coelenterates and brachiopods. 3220—Phoronida to Hemichordata, including annelids, molluscs, arthropods and echinoderms. May be taken separately or in any order. Prereq: 3260, Rocks and Minerals 2120 or consent of instructor. 3 hrs and 1 lab or field period.

*3250 Micropaleontology (4) Microscopic remains of animals and plants with special emphasis on stratigraphically important groups. Prereq: 3210 or consent of instructor. 3 hrs and 1 lab.

*3260 Paleobotany (4) Introduction to principles and materials of paleobotany as applied to interpretation of earth history. Prereq: 1420. 3 hrs and 1 lab or field period.

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

*3310 Introductory Petrology (4) Introduction to classification and properties of igneous and metamorphic rocks, processes which produce them, and tectonic environments in which they form. Laboratory emphasizes both hand specimen and microscopic study of important rock types. Prereq: 3180. 3 hrs and 1 lab.

*3330 Geology of East Tennessee (4) Lectures and field excursions. Prereq: 12 hrs of geology and consent of instructor.

*3360 Stratigraphy-Sedimentation (4) Introductory study of stratigraphic principles and practices of sedimentary processes and interpretation of depositional environments. Prereq: 3310 or 3180. 3 hrs and 1 lab or field period.

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

*3410 Principles of Ground Water Geology (3) Geologic problems involving earth environment and resources, and geologic parameters associated with their control and misuse. Prereq: 1420 or consent of instructor. 2 hrs and 2 labs or field periods.

*3610 Quaternary Geology for Engineers (3) Environmental and depositional processes, landforms, ground water. Prereq: 2510 or equivalent. 2 hrs and 1 lab or field period.


4110 Principles of Economic Geology (4) Formation of mineral deposits. Prereq: 3180, 3370, or equivalent.

4115 Elementary Applied Geophysics (4) Basic principles of electrical, seismic, gravity and magnetic methods and procedures. Prereq: 1420, Physics 2220 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 Paleocoeology (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 2510; Botany 3010-20 or consent of instructor. (Same as Botany 4240.) 3 hrs and 1 lab or field period.

4240 Field Geology (8) Five-week field course, first term summer quarter. Advanced undergraduate or first-year graduate in geology. Emphasizes entire time of students. A report is required, to be submitted no later than end of fall quarter. Prereq: 12 hrs geology and consent of instructor.

4460 Geologic Photography and Photogrammetry (4) Principles of terrestrial and aerial geologic photography, including photographic principles and practice, geometry of terrestrial and aerial photographs, and image interpretation. Prereq: 3370 or consent of instructor. 3 hrs and 1 lab.

4510 Principles of Geomorphology (4) Gravitational processes affecting at earth's surface and landforms produced. Prereq: 1410 or consent of instructor. (Same as Geography 4510.) 3 hrs and 1 lab.

4550 Optical Mineralogy (4) Identification of nonopaque substances by immersion methods, using petrographic microscope.

4610 Principles of Geochemistry (4) Application of chemical principles to geologic problems. Emphasis on crystal chemistry and relation between basic atomic structure and distribution and behavior of elements in the earth's crust. Prereq: Chemistry 1110-20 or equivalent. Recommended: 3310.

4650 Mineral Phase Equilibria (3) Principles of phase chemistry and application of phase equilibria to classification of minerals and study of reaction aids to understanding conditions of formation and modification of rocks. Prereq: 4610 or consent of instructor.

4810 Special Problems in Geology (1-4) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

5000 Thesis

5050 Geoc hemistry of Ore Mineral Deposits (3) Study of ore deposits based on experimental, empirical, and theoretical geochemical considerations. Prereq: 4650 and 4110 or consent of instructor.

5069 Experimental Geochemistry Laboratory (1-3) Independent lab study of problem in geochemistry using lab techniques. Prereq: Consent of instructor.


5130 Geophysics—Seismic Exploration Methods (4) Seismic reflection methods and interpretation of reflection 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, 1-4)

5290 Quaternary Geology (6) Five-week field course, first term fall quarter. Advanced undergraduate or first-year graduate in geology. Emphasizes entire time of students. A report is required, to be submitted no later than end of fall quarter. Prereq: 12 hrs geology and consent of instructor.

5310 Advanced Stratigraphy and Sedimentation (4) Integrated field-oriented study of sedimentary rocks, analysis of depositional environments, paleoecological and paleogeographic-paleontological setting. Prereq: 3360 or equivalent, 4130.

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/NC only.

* Not available for graduate credit for geology majors.
5340 Ore Microscopy (4) Study of ore mineral assemblages by reflected light microscopy. Techniques such as x-ray diffraction and electron microprobe analyses necessary. Prereq: 4110, 4550, and consent of instructor. 2 2-hr labs.

5850 Regional Studies in Economic Geology (3) A study of the origin, occurrence and control of specific mineral deposits and districts, followed by trips between quarters to study in field. Prereq: 4110 and consent of instructor. May be repeated. Maximum 9 hrs. 2 hrs and 1 field trip.

5915 Regional Geomorphology (4) Selected geomorphically-related areas, which have common elements such as history or development, are studied in terms of the related processes which have produced genetically similar assemblages of landforms. May be repeated with consent of department. (Same as Geography 5915.)

6000 Doctoral Research and Dissertation

6110 Seminar in Stratigraphic Geology (3)

6210 Seminar in Paleontology (3)

6310 Seminar in Structural Geology (3)

6410 Seminar in Mineralogy (3)

6510 Seminar in Petrology (3)

6610 Seminar in Economic Geology (3)

6710 Seminar in Geochemistry (3) Prereq: 4610 or consent of instructor.

6810 Seminar in Geomorphology (3) Prereq: 4110 or consent of instructor.

Germanic and Slavic Languages

MAJORS

German

MA, M.ACT

German Language and Literature

Ph.D.

MACT 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 MACT degree would be well prepared to go on 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 graduate programs (5200 and 6210-20-30-40-50-60 and 6310-20-30). At least 9 hours must be taken in a cognate field. Students must show a fluent command of German, both oral and written, and a knowledge of two other foreign languages, Germanic, Slavic, Japanese, or Russian, appropriate to the field of research. A preliminary comprehensive examination, both written and oral, on German language and literature and the minor field or fields, must be passed before the student may be admitted to candidacy. The student will be examined on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. The candidate will be expected to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the final oral defense. The dissertation will be expected to show the candidate’s scholarly qualifications.

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

3010-20-30 Elements of German for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reinforced knowledge of the language. Undergraduate credit only. No credit for students having completed elementary German.

3210-20-30 German Literature in English Translation (3-4) Prose readings of sagas of Norwegian
Plan II: History 5240, and either 5250 or 5260; two M.A. reading courses; 12 additional hours 5300 or above, at least 2 of which must be 5310-30-40; and 7 total hours—45. Plan I and Plan II require evidence of proficiency in one foreign language before the M.A. degree is granted.

Master of Arts in College Teaching—Course requirements include History 5240-50-60, 5271-72-73, and Continuing and Higher Education 5110. Students must spend one year as a graduate assistant and one year as a teaching assistant. Total hours, including thesis—60. Students seeking the MACT degree may substitute 9 quarter hours of courses numbered 6300 or above for the Master’s thesis.

THE DOCTORAL PROGRAM

1. Admission: (a) Acceptable scores on the Graduate Record Examination (General Aptitude and History Achievement).

(b) Students successfully completing the M.A. degree at The University of Tennessee must be recommended by the Department of History.

(c) Students from other institutions should have an M.A. degree and must be recommended and approved by the Graduate Awards and Review Committee after their first year of work at The University of Tennessee.

2. Residence and Course Work: Beyond the Bachelor’s degree a minimum of 75 credit hours in course work is required, of which 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 shall be required to possess a reading knowledge of one language and such additional language or languages as may be determined by the student’s graduate committee. Under normal circumstances students specializing in European history will need two languages. The committee may also specify any other research tools, such as statistics, which it regards as essential for the student’s preparation.

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 forms and the time of the examination may be obtained from the Graduate School.

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

5. Preliminary Examinations and Committee: Incoming students will be advised by the department head.

The preliminary examinations must be taken after all course work is completed, language requirements fulfilled, and at least nine months before the degree is expected. These exams should normally be taken before beginning the ninth quarter of work toward the doctorate. The candidate must present four fields, distributed as follows: one major field (history or minor fields (history); and one minor field which may be either in history or outside the department. In any case, the student is required to have 9 hours of graduate work outside the History Department. Three of the four areas listed below must be represented by a major or a minor field, or both.

I. Ancient and Medieval

(1) Ancient Near East
(2) Greece
(3) Rome
(4) Early Middle Ages, 375-1122
(5) Late Middle Ages, 1095-1450

II. Early Modern

(1) Renaissance and Reformation
(2) Europe, 1559-1815
(3) American History to 1815
(4) Latin America, 1492-1825

III. Modern

(1) Europe, 1815-1914
(2) European World Since 1914
(3) United States, 1815-present
(4) Latin America, 1789-present
(5) East Asia, 1641-present
(6) Middle East, 1798-present

IV. National, Sectional and Topical:

(1) England, 1485-1763
(2) Great Britain, 1760-present
(3) France, 1559-1815
(4) France, 1789-present
(5) Germany, 1555-1806
(6) Germany, 1806-present
(7) Russia, 1800-1900
(8) Russia, 1900-present
(9) Colonialism and Imperialism
(10) Diplomatic History of the United States

III. Modern

(11) Social and Cultural History of the United States
(12) The South
(13) Frontier and Westward Movement
(14) Afro-American

Preliminary examinations will be both written and oral.

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

3060-70 History of European Thought

3140-50-60 History of Religion

3445-46 History of France (4, 4) 3445—To 1785. 3446—Since 1787.

3470-80-90 History of Russia (3, 3, 3) 3470—To 1801. 3480—Nineteenth Century. 3490—Twentieth Century.

3510-20 The American Colonies and the American Revolution (3, 3) 3610—Settlements to 1754. 3620—1754-1789.


3710-20-30 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.

3740 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 fourteenth centuries. Emphasis on the relationship between demographic, economic and social foundations of cities and political and cultural development.

3751-52 Ancient Near Eastern Civilization (3, 3) 3751—Egypt and Mesopotamian Bronze Ages. 3752—Late Bronze and Iron Ages.

3760-70 The Ancient World (3, 3) 3760—Greece. 3770—Rome.

3780-90 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.

3795 Contemporary Middle East (4) Background of current problems in the area, from World War II to present.

3800 North Africa Since 1830 (3) Morocco, Algeria, Tunisia, and Libya in the nineteenth and twentieth centuries.

3810-20-30 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 1920s. 3830—Contemporary China, Japan, and Korea, 1920s to present.

3870-80-90 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, 1800 to present.


4015 Studies in History (3-4) Variable content course affording opportunity to offer subject matter not covered in an existing course. May be repeated.

4120-30 History of Colonialism and Imperialism (3, 3) 4120—Background; age of discovery and exploration to nineteenth century. 4130—Nineteenth century to present.

4250-60-70 European Intellectual and Cultural History (3, 3, 3) 4250—From Reformation to the Enlightenment. 4260-70—From the Enlightenment to the Age of Realism, 1700-1870. 4270—From Subjectivism to Relativism, 1870-present.

4280 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 and institutions. Emphasis on women's protest movements.

4290 Women in American History (4) Approaches of 4290 applied to American Society.
4310-20-30 History of American Foreign Relations (3, 3, 3) 4310—Revolutions to 1901. 4320—1901-1941. 4330—1941 to present.

4360 The United States in World War II (4) Military, diplomatic, and domestic experience.

4370 U.S. Military History, 1754 to the Present (4) Examination of nation's broad strategic aims and means used to attain them, shifting strategy, tactics, and weaponry, usual in our wars, and relationship between American society and its armed forces.

4380 Civilian-Military Relationships in the Modern World (3) From the Napoleonic Wars to the modern military affairs from about 1900 to 1960 in Western Europe, Russia, and America; emphasis on Western Europe; e.g., Dreyfus Affair, Army in Nazi Germany, and Truman-MacArthur controversy.

4410-20-30 Europe in the Twentieth Century (3, 3, 3) 4410—1890-1919. 4420—1919-1939. 4430 to present.

4470 Poland and Its Neighbors (3) A survey of Polish history from its beginnings to present with some emphasis on the Polish question with: in context of modern international affairs.

4480 Russian Intellectual History (3) From eighteenth century to present, emphasizing problems of Westernization, nationalism, and revolutionary tradition.

4490 Soviet Foreign Policy (3)

4500 History of Medieval England (3)

4519-20 Tudor-Stuart England (3, 3) 4510—1485-1603. 4520—1603-1714.

4551 Great Britain from Burke to Bright (1780-1848) (3)

4570 Twentieth-century Britain (3)

4580 Revolution and Reform: Ireland in the Nineteenth and Twentieth Centuries (4)

4590 History of Canada, 1775—Present (3)

4610-20-30 The American Frontier and Westward Movement I, II, III (3, 3, 3) Settlement and development of the "West" throughout American history. 4610—From the Atlantic to the Mississippi. 4620-30—The Trans-Mississippi West.

4640-50-60 Social and Cultural History of the United States (3, 3, 3) 4640—Colonial Society and Early Nation to 1825. 4650—1825-c. 1900. 4660—1900-present.

4670 Cities and Urbanization in American History (4) Origins, growth and influence of American cities in development of the nation, from colonial era to present.


4741 Italian City-States, 1250-1560 (3) Evolution of urban civilization in northern and central Italy in medieval and Renaissance periods. Architectural and landscape forms studied in socio-economic as well as cultural contexts. Florence is primary focus, but other major city-states also included.

4770-80 Austria and Central Europe (3, 3) 4770—To 1607. 4780—Since 1607.

4791 Modernization of the Middle East (3) Advanced reading and discussion course which examines key facets of political, economic, and social history in contemporary Middle East with emphasis on institution building, elites, and ideology. Prereq: 3795 or consent of instructor.

4792 Historical Writers in Islamic History (3) Advanced reading course which introduces the student to the major historical writers of the Middle East from Ibn Khaldun to modern times. Prereq: 6 Middle East History or consent of instructor.

4811-21 History of Japan (4, 4)

4840 History of Mexico (3)

4850 History of the Caribbean (3) Caribbean region from discovery and colonization to contemporary times.

4870-80-90 China (3, 3, 3) 4870—Cultural history of China. 4880—Contemporary China. 4890—History of contemporary China.


5000 Thesis

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

5015 Periods in European History (3) May be repeated. Maximum 9 hrs.

5016 Periods in American History (3) May be repeated. Maximum 9 hrs.

5011 Foreign Study (1-12) See page 100.

5012 Off-campus Study (1-12) See page 100.

5030 Independent Study (1-12) See page 100.

5211-5225 M.A. Reading Courses (3 hrs each) Directed reading courses in preparation for fields required for Master's oral examination. 5211, Ancient; 5212, Medieval; 5213, Early Modern Europe; 5214, Europe Since 1780. 5215, American History to 1915. 5216, American History Since 1789. 5217, Latin America. 5218, Far East; 5219, Colonialism and Imperialism. 5221, Western Europe; 5222, Russia; 5223, Germany; 5224, France; 5225, Middle East. Open only to Master's candidates in history. S/NC only.

5240 Introduction to Historical Research (3) Principles and techniques of research in the study of history. Required of all candidates for advanced degrees who do not present evidence of similar training elsewhere.

5250 European Historiography (3) Introduces the student to the historical literature of leading European nations.

5260 American Historiography (3) Like 5250 in the American field.

5271-72-73 The Teaching of College History (0, 0, 3) Introduction to problems of teaching at college level. Typical course in curriculum, types and levels of courses, and techniques of teaching. Prereq: Consent of instructor. Required of all candidates for the M.A. Credit will be withheld until the completion of 5273, with grades of "S" or "NC" submitted at end of each of first two quarters.

5280 Philosophy and Methodology (3) Philosophies of history and their relationship to milieu from which they emerge; modern trends in historical methodology.

5290 Quantitative Analysis of Historical Data (3) Prereq: Sociology 5320 and 5330, or consent of instructor.

5300 Topics in History (3)

5310 Topics in Women's History (3)

5320 Topics in Historical Editing (3) Principles and practice of editing documents.

5360 Topics in American Foreign Relations (3)

5410 Topics in Early Modern European History (3)

5440 Revolution and Restoration in Central Europe, 1780-1850 (3) Reform, resistance, and the advent of Liberalism and Nationalism.

5444 Topics in French History (3)
Mathematics

MAJOR

Mathematics

DEGREES

Mathematics

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

Professors:
L. Ang (Head), Ph.D. Pennsylvania; G. E. Albert (Emeritus), Ph.D. Wisconsin; J. S. Bradley, Ph.D. Iowa; J. H. Naruth, Ph.D. Louisiana State; R. E. Clines, Ph.D. Purdue; A. J. Daverman, Ph.D. Wisconsin; D. J. Dessart, Ph.D. Maryville (Emeritus); Texas; H. Frandsen, Ph.D. Illinois; D. A. Gardiner, Ph.D. North Carolina State; R. T. Gregory, Ph.D. Illinois; T. G. Hallam, Ph.D. Missouri; D. B. Hinton, Ph.D. Tennessee; A. S. Householder (Emeritus), Ph.D. Chicago; L. H. Husch, Ph.D. State; R. M. McConnel, Ph.D. Duke; H. T. Matthews, Ph.D. Tulane; D. Michigan; J. J. Plemmons, Ph.D. Auburn; K. C. Reddy,* Ph.D. Indian Institute of Technology (India); P. W. Schaefer, Ph.D. Virginia; F. W. Stallmann, Ph.D. Gießen (Germany); R. W. Wade, Ph.D. California (Riverside).

Associate Professors:

Assistant Professors:

Math 3050, 3600, 3090, 3100, 3110, 3310, 3320, 3330, 3510, and 3720, are intended primarily for students preparing to teach in elementary or secondary schools.

Math 3050 offers 4000 course in the department whose course number ends in "O" may be offered as an honors version. In this case, the last digit will appear as an "8" and the title will be preceded by the word "Honors." Math 3050 is in the timetable and on the student's transcript. Honors courses listed in the Graduate Catalog are acceptable for graduate credit. Such courses may be offered upon the initiative of interested faculty, students, or the department head (though in all cases subject to the approval of the approval of the department head).

Masters of Mathematics Program

The Master of Mathematics degree is intended primarily for teachers of high school mathematics.

Before admission to this program, the applicant must successfully pass a qualifying examination in the area of specialization.

The following requirements must be met:

1. Completing 45 hours of course work, of which at least 9 must be at the 5000 level. The course work must include:
   a. 36 hours of mathematics courses numbered above 4000 and approved by both the major department and the Department of Education.
   b. 9 hours of additional work from mathematics courses numbered 3050 or above or from courses in other departments selected in consultation with the advisor.
2. Passing a comprehensive examination upon completion of all course work.

The Master's Programs

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

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

After two quarters of graduate study, a student whose supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 4000 are required. Of these, 27 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the 45 hours, 15 in courses approved by the supervisory committee may be taken in fields other than mathematics. For this option it is also required that a written comprehensive examination be passed, and that credit be received for a 3-hour seminar or reading course (6990-9995) in which a term paper or project is required.

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

The Doctoral Program

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

1. Pass written examinations in four of the following subjects to the extent indicated by the accompanying course numbers and such other topics as the graduate faculty may prescribe:

   These student must pass at least two examinations from Group a; anyone passing two examinations from Group b will be required to take an approved one-year graduate course (numbered 5000 or above), in which mathematics is extensively used, outside of the mathematics department, and not cross-listed as a mathematics course.

2. Pass an intensive examination in the student's area of specialization.

3. Demonstrate a reading knowledge of two of the following languages: French, German, Russian, or approved alternative. At least one language requirement must be met before taking a written examination in the student's third area and the second language requirement met before taking the exams in the student's area of specialization.

4. Complete an approved one-year 6000-level course in mathematics outside the area of specialization.

5. Complete a dissertation consisting of original and significant research.

6. Pass a final oral examination.

Study in a cognate field is not required by the mathematics department. Registration in any course in the 6000 series may be repeated for credit with the permission of the department.

*3050 Elementary Probability and Statistical Analysis (3) Combinatorial problems, sample spaces, sets, and events; statistical independence; axiomatic probability theory; random variables and their distributions; simple random processes. Prereq: 1550-60 or equivalent.

*3060 Elementary Statistical Analysis (3) Elementary probability distributions used in statistics: binomial, Poisson, and normal and their properties; sampling theory; confidence intervals and statistical tests of hypotheses; least squares and linear regression. Prereq: 3050 or consent of instructor.

3090 Polynomials and Rings (3) An introduction to abstract algebra, beginning with study of integers followed by more general notion of rings, integral domains, and fields. Emphasis is given to certain ring theoretic properties shared by integers and polynomial rings over certain fields. Prereq or coreq: 3100 or consent of instructor.

3100 Logic and Sets (3) Elements of mathematical logic; elementary algebra of sets. Primarily for students in the College of Education. Prereq: 1 yr of college mathematics.

*3110 Real Number System (3) Laws of arithmetic; rational and irrational numbers; fields. Prereq: 1 yr of college mathematics. Primarily for students in the College of Education.

3150 Introduction to Numerical Algorithms and Programming (3) (Same as Computer Science 3150)

3155 Introduction to Numerical Algorithms (3) (Same as Computer Science 3155)
3220 History of Mathematics (3) Survey of develop-
ment of major branches of mathematics, from ancient to modern times. Prereq: 1860 or 2560 or equiva-
 lent.

3310 Advanced Euclidean Geometry (3) Triangles
and circles, constructions, modern concepts. Prereq: 1 yr of college mathematics.

3320 Non-Euclidean Geometry (3) Foundations of
hyperbolic, elliptic, and projective geometries. Prereq: 1 yr of college mathematics.

3330 Transformational Geometry (3) Fundamen-
tal transformations in Euclidean geometry, Classi-
fication of isometries and similarities; symmetries of a polygon; inversions. Prereq: 1 yr of college mathematics.

3510 Intermediate Analysis (3) Primarily for stu-
dents in secondary mathematics education. Course covers, elementary calculus from an ad-
vanced viewpoint with emphasis on proofs of basic theorems. Topics covered include limits of elementary set theory, relations and functions, derivatives, definite integral, and fundamental theorem of integral calculus. Prereq: 1550-60 or 1860.

3715 Discrete Structures (3) (Same as Computer
Science 3715).

3720 Theory of Equations (3) Techniques for find-
ing roots of polynomial equations. Topics covered include complex, integral, and rational roots, bound roots, separation of roots, Sturm's theorem, Horner's method of approxi-
mating roots, and formulas for quadratic, cubic, and biquadratic equations. Prereq: 1 yr of college mathematics.

3780-90 Introduction to Combinatorial Theory (3,
3) Introduction to problems of arrangement and enumeration, including applications in graph theory, finite geometries and finite fields, partitions, block designs. Prereq: 2860 or consent of instructor.

3810 How to Prove It (3) Course is designed to
improve understanding of nature and methods of mathematical proof by means of practice and participation in seminar setting. Many courses may include certain standard topics such as proofs by induction, set theory, relations and functions, and mathematical induction. Coreq: 2850 or 2950.

3920-30 Topology of Euclidean Spaces (3, 3)
Topics will include topology of line and plane, separation properties, connectedness, compactness, continuous functions, homeomorphisms, continuity, and topological invariants of segments and triangles. Prereq: 3810, 2868, or consent of instructor.

3990 Studies in Mathematics (1-4) Credit deter-
mined at registration. Prereq: Consent of in-
teacher. May be repeated with consent of depart-
ment. Maximum 12 credit hours.

4050 Matrix Algebra and Applications (3) Mat-
ricies, elementary operations, systems of linear equations, vector spaces, determinants, eigen-
values and eigenvectors. Prereq: 2850 or 2860 or consent of instructor.

4060-70 Matrix Algebra and Applications (3, 3)
Eigenvalues and eigenvectors, singular values and singular vectors, unitary and similarity transfor-
mations, Jordan canonical form, and related topics. Prereq: 2860 or 4050.

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

4150-60 Abstract Algebra (3, 3) Equivalence rela-
tions and partitions, properties of integers, ele-
mentary theory of groups and rings, polynomial rings, integral domains, divisibility, unique fac-
torization domains, fields. Must be taken in se-
quence. Prereq: 2860 or 4050.

4225 Numerical Solution to Equations and Num-
eral Approximations (3) Numerical solution to equations involving the use of computers, intro-
duction to computer, installabilities, rounding errors. Solution of a single nonlinear equation; introduction to the linear and nonlinear systems. Polynomial equations; power and inverse power methods for eigenvalues. Approximation of functions, piecewise polynomials, trigonometric and rational functions. Prereq: 3150 or 3155. (Same as Computer Science 4245.)

4225 Numerical Methods for Ordinary Differenti-
al Equations (3) Interpolation by polynomials and piecewise polynomials; quadrature; single-
step and multi-step methods for differential equations. Stability, consistency and converge-
tence. Current algorithms, variable step and order; stiff systems. Boundary value problems. Prereq: 3150 or 3155 and 4610 or 4225. (Same as Computer Science 4235.)

4245 Numerical Linear Algebra (3) Review of vec-

4250 Elementary Complex Variables (3) Complex
functions, Cauchy-Reimann equations, elemen-
tary functions, Cauchy's theorem and formula, Taylor and Laurent series, residues and their
applications. Prereq: 2860; one 4000-level mathe-
matics course or consent of instructor.

4510-20-30 Introduction to Analysis (3, 3, 3) Real
number system, functions, sequences, limits, continuity, uniform continuity, differential-
integration. Functions of several variables, im-
plicit function theory. Multiple integrals, infinite
series, sequences and series of functions, uni-
form convergence. Taylor series. Should be taken in sequence. Prereq: 2860.

4540 Infinite Series and Functions of Several Vari-
ables (3) General theory, power series and Taylor's formula, uniform convergence. Partial
differentiation and maxima and minima for func-
tions of several variables. LaGrange multipliers. Prereq: 2860.

4550 Partial Differential Equations (3) Fourier
series; orthogonal functions; the vibrating string; solution by series; heat flow. Bessel functions. Prereq: 2860. Re-
commended: 4245.

4610-20-30 Ordinary Differential Equations (3, 3,
3) 4610—Linear first and second-order equa-
tions. Power series solutions and Legendre poly-
nomials. Frobenius method, and Bessel equations. Systems of linear differential equations and the matrix exponen-
tial. 4620—Numerical methods for ordinary dif-
fferential equations including one-step methods (Euler, Runge-Kutta) for initial value problems, multistep methods, A-stability, and two point boundary value problems. 4630—Special topics which may include existence and uniqueness, oscillation theory, Liapunov stability, singular per-
turbations, and asymptotic solutions. Prereq: 4610. 2860 or 4050; 4620: 4050 or 2860; and 3150 or 3155, 4630: 4610 or consent of instructor.

4640 Calculus of Finite Differences (3) Real dif-
finitions and notations; introduction to problems in engineering and physics. Prereq or corq: 4610.

4650-60-70 Introduction to Mathematical Statis-
tics (3, 3, 3) Introduction to probability; discrete and continuous distributions; correlation, regres-
sion, and statistical independence; foundations of sampling theory, significance tests. Must be taken in sequence. Prereq: 3150 or 3155.

4710 Vector Analysis (3) Fundamental opera-
tions, basis vectors, dot and cross products, di-
rectional derivatives, divergence and curl of vec-
tors; line, surface, and volume integrals, divi-

4750-60-70 Introductory Probability Theory (3, 3, 3) 4750—Elementary combinatorial analysis, probabilities, expectation and variance; expectation and variance functions, binomial, Poisson, hypergeometric and normal distributions. 4760—Stochastic processes; expectation and characteristic function of random variables, infinite sequences of random variables, convergence of expectations, Markov chains, limiting probabilities; steady-state and stationary distributions; Stochastic proc-

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

4890 Readings in Mathematics (1-3) Open to su-
perior students with consent of department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

4990 Studies in Mathematics (1-4) Credit deter-
mined at registration. Prereq: Recommendation of Mathematics Department faculty member and consent of department. May be repeated. Maximum 9 hrs.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not other-
wise recommended by the advisor. A student must register and use university facilities and or/for fac-
ty time before degree is completed. May not be used toward degree requirements. May be re-
pealed; S/N only.

**5011 Elementary Functions from an Advanced Standpoint for Teachers (3-4) Order and com-
pleteness axioms and real numbers; limits of sequences, derivatives of functions, power series, and derivatives of exponential, logarithmic and trigonometric functions; infinite series; conver-
gence; Taylor's and Maclaurin's series; methods for the construction of logarithmic and trigono-
tic tables. Prereq: 3510 or 3160 or consent of instructor.

**5012 Differential Geometry for Teachers (3-4)
Advanced techniques applied to graphing func-
tions. Curves, surfaces, parametrizations, singu-
lar points, tangent lines and tangent planes, osculating planes, arc length of curves in plane and curves on surface, curvature, torsion, asymptotic lines, local coordinates, Frenet 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 representations of geometry and the
high school geometry class: axioms, synthetic and metric; models; betweenness; congruence of segments and triangles; parallelism; similarity; area; ruler and compass construc-
tions; Klein's Erlangen Program. Prereq: Con-
sent of instructor.

**5014 Analysis for Teachers (3-4) Functions of
several variables, vectors, limits and continuity, par
ditional derivatives, directional derivatives and
gradient, implicit function theorem, maxima and
minima, transformations. Prereq: 3510 or con-
sent of instructor.

**5015 Probability and Statistical Inference for
Teachers (3-4) Probability distributions including binomial, hypergeometric, and Poisson; moment functions; expectation and continuous random variables; moment generating functions; expectation of continuous random variables; moment generating functions of uniform and normal distributions. Sampling in-
cluding Chi-square, F, and t distributions; inter-
pretation of correlation coefficients. 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 propo-
sitional theory; Gentzen's sequence-calculus

** This course is intended for student in the Master of Mathematics program, or only for students in the M.A. or M.S. degree in Mathematics.
and systems of natural deduction; algebraic logic; concepts of first order theories; elementary model and recursion theory; consistency, completeness, decidability.

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


5210-20-30 Theory of Functions of a Real Variable (3, 3, 3) Sets and real valued functions in Euclidean spaces; abstraction of these concepts, Lebesgue measure and integration; abstract measure and integration. Classical function spaces, such as Lp spaces. Generalized Fourier series theory, Special topics. Prereq: 4510-20-30. Must be taken in sequence.

5240-50-80 Linear Analysis (3, 3, 3) Metric spaces, finite and infinite dimensional Banach and Hilbert spaces, linear operators, vector and operator norms, spectral theory. Examples to be chosen from relevant applied areas. Prereq: 4510-20-30.


5310-20-30 Introduction to Higher Geometry (3, 3, 3) Projective spaces; coordinates and transformations; conics and quadrics. Elliptic and hyperbolic geometry from viewpoint of projective geometry. Prereq: 4510-20 or 4550.


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

5475 Advanced Topics in Numerical Partial Differential Equations (3) Advanced topics in numerical solution of partial differential equations. FEM for solution of ordinary and partial differential equations, BVP problems with singularities. Other topics, such as special methods, further study of FDM etc. at discretion of instructor. Prereq: 4545-65. (Same as Computer Science 5475.)

5490-50-1900 Mathematical Programming (3) Optimization of functions or variables subject to constraints. Prereq: 3150, 4610 and 4530.

5510-20-30 Introduction to Higher Algebra (3, 3, 3) Algebraic systems: groups, rings, integral domains, fields. Must be taken in sequence.

5540 Galois Theory (3) Fields and their extensions. separable and normal extensions, algebraic closure, groups of automorphisms, fundamental theorem, solvability of equations, by radicals. Prereq or coreq: 5520.

5560-70-80 Theory of Matrices in Numerical Analysis (3, 3) Matrices. Identities and inequalities; factorization theorems, generalized reciprocals, Hadamard inequalities, Lanzos procedure, QR factors, eigen values and norms, convergence, domains of inclusion and exclusion of roots of matrices; the field of values; matrix algebraic and maximal theorems for Hermitian matrices; Kantorovic inequalities. 5580—Computational methods for inverting matrices, direct and by successive approximations, methods of reduction to normal form; successive approximations to roots of matrices; numerical error. Prereq or coreq: 5520.

5590 Theory of Rings (3) Direct and subdirect sums of rings, prime and maximal ideals, prime radicals and rings of endomorphisms; radicals; Wedderburn-Artin structure theorem. Prereq: 5520.

5610-20-30 Mathematical Methods in Physics (3, 3, 3) (Same as Physics 5610-20-30.)

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

5655-65-75 Numerical Mathematics (3, 3, 3) Numerical solution of large systems of linear algebraic equations, systems of nonlinear equations and algebraic eigenvalue problem. Prereq: 4455 or 4255. (Same as Computer Science 5655-65-75.)

5710-20-30 Tensor Analysis (3, 3, 3) Absolute differential calculus; Differential calculus in Euclidean space; differential geometry of curves and surfaces; applications to physics; extension to R-diendimensional space. Prereq: 4510-20 and 4530. Must be taken in sequence.


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

5840-50-60 Mathematical Ecology (3, 3, 3) Discrete and continuous models in ecology. Population growth models, random models, ecological models, models with singularities. Other topics, such as deterministic systems, stability and application to control theory. Prereq: 5110-20-30. Must be taken in sequence.

5850-90-100 Mathematical Systems Theory (3, 3, 3) Topological spaces; metrization, homeomorphic invariants of open sets; structure of Peano continua. Mapping, homotopy. Introduction to combinatorial topology.

5870-80 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 chaos in modern dynamical systems.

5890 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.

5910-20-30 Seminar Analysis (1-3)

5912 Seminar Topology (1-3)

5913 Seminar Algebra (1-3)

5914 Seminar Foundations (1-3)

5915 Seminar Applied Mathematics (1-3)

6000 Doctoral Research and Dissertation

6210-20-30 Linear Analysis (3, 3, 3) Algebraic and topological properties of linear spaces, emphasis on normed linear spaces and dual spaces; linear transformations; special topics. Prereq or coreq: 5110-20 and 5120-20-30 or consent of instructor.

6210-20-30 Modern Algebra (3, 3, 3) Intensive study of some major branch of algebraic theory. Subject matter will vary according to interests and preparation of students. Prereq: 5110-20-30.

6240-50-80 Theory of Semigroups (3, 3, 3) Constructions and applications; limited ideal theory; representations, decompositions, and extensions; free, regular, inverse, simple, and completely simple semigroups. Prereq: 5520.

6270 Theory of Groups (3) Structure of groups, free groups, nilpotence and solvability, extensions and products, permutation groups, abelian groups. Prereq: 5520.

6280-20-30 Advanced Ordinary Differential Equations (3, 3, 3) Theory of ordinary differential equations from advanced viewpoint. Topics from current literature. Subject matter varies according to interests of student. Prereq or coreq: 2610 or 4610, 4510-60, and 5110-20-30 or 5210-20-30 or consent of instructor.


6280-20-30 Topological Algebra (3, 3, 3) Topics chosen from topological semigroups, topological...
groups, Lie groups; transformation groups; topological lattices; relations in topological spaces; topological rings, fields, algebras. Prereq or coreq: 5910-20-30.

6910-20-30 Modern Topology (3, 3, 3) Technical background to current literature in topology. Topics vary from year to year.

6940-50-60 Introduction to Algebraic Topology (3, 3, 3) Homology, cohomology, and homotopy theories. Homology and cohomology groups, the Eilenberg-Steenrod axioms, cup and cap product, duality theorems, homotopy equivalence, higher homotopy groups, fiber spaces, spectral sequences. Prereq: 4160 and 5920.

6991 Seminar Analysis (1-3)
6992 Seminar Topology (1-3)
6993 Seminar Algebra (1-3)
6994 Seminar Foundations (1-3)
6995 Seminar Applied Mathematics (1-3)

Registration for seminars may be repeated with consent of department.

Microbiology

MAJOR DEGREES

Microbiology M.S., Ph.D.

Professors:
C. Brown (Chair), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; T. C. Morgan, Ph.D. Maryland; J. O. Muller, Ph.D. Michigan State; J. M. Woodward, Ph.D. Kansas; C. J. Wust, Ph.D. Indiana.

Associate Professors:
H. L. Adler, Ph.D. Cornell; B. B. Bellomy, M.D. Georgetown; W. Parkas, Ph.D. Duke; T. R. Reese, Ph.D. Gujarat (Canada).

Assistant Professors:
D. A. Bemis, Ph.D. Cornell; D. A. Brian, Ph.D., D.V.M. Michigan State; G. S. Sayer, Ph.D. Idaho.

Lecturers:
W. F. Barr, Ph.D. Cornell; W. S. Riggio, Ph.D. Yale; B. R. Rouse, Ph.D. Georgia.

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

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

3810 Food Bacteriology (4) Standard methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Prereq: 2910 and Chemistry 2230 or 3211. 2 hrs and 2 labs.

3820 Yeast and Molds (4) Morphology, taxonomy, and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: 2910 and Chemistry 2230 or 3211 or consent of instructor. 2 hrs and 2 labs.

4110 Physiology of Bacteria (2) Modern concepts of bacterial physiology and metabolism including cell structure and function. Prereq: 3510 and 12 hrs of organic chemistry.

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

4120 Taxonomy of Bacteria (3) Bacterial classification. Prereq: 3510-19.

4140 Molecular Genetics of Prokaryotes (2) Transmission and expression of genetic information at the molecular level. Emphasis is on bacterial and viral systems, but unique features of eukaryotic genetic systems are included. Prereq: 3510 or consent of instructor.

4150 Microbial Ecology (3) Application of ecological principles to study of microbial communities. Emphasis on functional role of microorganisms in natural environments. Prereq: 3510, 1 yr of organic chemistry, Biology 3130, or consent of instructor.

4270 Advanced Immunology (2) Chemistry of antigens and haptenes, theories of antibody formation, cell cooperation in immune mechanisms, transplantation, abnormalities of the immune system, and autoimmune diseases. Prereq: 3520 or consent of instructor. (Same as Zoology 4270.)

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

4310-20-30 Modern Topology (3, 3, 3) Evolutionary principles. Homology and cohomology groups, the Eilenberg-Steenrod axioms, cup and cap product, duality theorems, homotopy equivalence, higher homotopy groups, fiber spaces, spectral sequences. Prereq: 4160 and 5920.

4320 Pathogenic Bacteriology (2) Disease producing microorganisms including bacteria, rickettsia, and chlamydia. Prereq: 3530.


4330 Medical Mycology (2) Disease-causing fungi; cytology; physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq: 3530 and 3820.

4339 Medical Mycology Laboratory (2) Prereq: 3519. Coreq: 4230.

4420 Molecular Virology (2) Molecular aspects of the replication, assembly and expression of animal viruses, with emphasis on bacteriophage. Prereq: 3510.

4430 Medical Virology (3) General virology with emphasis on medical aspects. Prereq: 3530.

4439 Medical Virology Laboratory (2) Laboratory procedures for isolation, handling and culturing of animal viruses. Prereq: 3530. Coreq: 4430.

5000 Thesis

5002-03-04-05-06 Thesis (1-3-3-3-3) Prereq: 5920. May be repeated with consent of department. S/NC only.

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, covering essential listing for topics offered. Prereq: as posted. May be repeated. Maximum 9 hrs. S/NC only.


5310 Selected Topics in Microbiological Research (3) Literature surveys and laboratory methods for development and interpretation of microbiological research. May be repeated.

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

5411-42-43-44-45-46 Clinical Microbiology (6, 6, 6, 6, 6) Six quarters, 6 quarter hrs each consisting of lectures and clinical laboratory experience. Enrollment by consent of department head. Prereq: 3519. Coreq: 4110.

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

5702 Microbial Physiology (3) Lectures and seminars dealing with current advances in bacterial physiology in general and cell structure. Prereq: 4110; Biochemistry 4110-20.

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

5750 The Oncogenic Viruses (3) Lectures and special laboratory exercises dealing with known tumor-inducing viruses. Prereq: 4430 or consent of instructor. 2 hrs and 1 lab.

5760 The Viral Diseases (3) Lectures and discussions dealing with viral diseases with emphasis on the biological and chemical consequences of bacterial infection. Text supplemented by readings from literature. Prereq: 4420; Biochemistry 4110-20.

5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetics concepts (mutation, complementation, recombination) at molecular level. Studies of lactose operon of Escherichia coli. Prereq: 4140 and Biochemistry 4110-20 or consent of instructor.

5820 Microbiology of Foods (3) Lectures and seminars dealing with current advances and selected topics in food microbiology with emphasis on analytical methods, safety and preservation. Prereq: 3519; Coreq: 4140. Recommended: Food Technology 4820.

5829 Experimental Microbial Ecology (3) Survey of techniques for assessment of microbial populations, forms, activities, and interactions in a variety of habitats. Prereq: 3519. Coreq: 4150 or consent of instructor. 1 hr and 2 labs.

5850 Seminar in History of Microbiology (1) Readings and discussions based on current literature. May be repeated. S/NC only.

5910-20-30 General Seminar (1, 1, 1) Reviews of current literature. May be repeated with consent of department. S/NC only.

6000 Doctoral Research and Dissertation

6310 Seminar in Microbiology (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6320 Seminar in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6330 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6340 Seminar in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. S/NC only.

6350 Seminar in Virology (1) Readings and discussions based on current literature. May be repeated with consent of department. S/NC only.

6360 Seminar in filamentous Fungi (1) Readings and discussions based on current literature. May be repeated. Maximum 9 hrs. S/NC only.

6370 Current Topics in Environmental Microbiology (2) Readings, discussions, and critical evaluation of current literature. May be repeated. Maximum 9 hrs. S/NC only.

6410 Concepts of Immunity (3) Discussion and readings of recent advances in immunobiology and immunopathobiology.

6720 Advanced Topics in Microbial Physiology (3) Prereq: 5720. May be repeated with consent of department. S/NC only.

6730 Advanced Topics in Microbial Pathogenesis (3) Prereq: 5730. May be repeated with consent of department. S/NC only.

6740 Advanced Topics in Virology (3) Prereq: 4420 or 4430. May be repeated with consent of department. S/NC only.

6760 Advanced Topics in Microbial Genetics (3) Prereq: 6340. May be repeated with consent of department.
Music

THE MASTER OF MUSIC PROGRAM

Music Theory: 45 hours distributed as follows: (a) 18 hours in music theory, (b) 3 hours in music history/literature, (c) 9 hours in music research, (d) 9 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 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) 12 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 history/literature, (f) 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) 3 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) 12 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 choral conducting performance or document, and (g) 12 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 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 music theory, (d) 9 hours in thesis, and (e) 6 hours in electives.

A reading knowledge of French or German must be demonstrable 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.

3041 Keyboard Harmony (2) Melody harmonization, figured bass realization, and improvisation.
4210 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 colonials to present. Emphasis on twentieth century. Includes both folk and cultivated traditions. Prereq: 1210-20 or equivalent.


4290 Gregorias Chant (3) Chants of Latin rite. Masses and Offices examined as functional music as well as by type.

4310 History of Art Song (3) Survey of art song from 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. 4340—instrumental works; 4350—vocal works.

4400 Jazz Directing (1) Rehearsal techniques for jazz ensembles: special conducting techniques, rhythm, and understanding the way the music sounds through supervised laboratory experience in rehearsals. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4480 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.

4580 Jazz Composition (3) Prereq: Music 4114 and consent of instructor.

4680 Advanced Improvisation (2) Emphasis on further development of individual skills and solving individual problems in jazz improvisation. Prereq: 3952-53.

5000 Thesis


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

*5010 Organ Literature Seminar (3) Topics vary. Prereq: Organ literature.

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


*5030 Choral Literature Seminar (3) Topics vary.

*5040 Vocal Literature Seminar (3) Topics vary.

5050 Graduate Recital (3)

5051 Opera Performance (3)

5052 Vocal Chamber Music Performance (3)

5053 Choral Conducting Performance (3)

5055-56 Practicum for Instrumental Conductors (1, 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: 4050 or equivalent.

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

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

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

*5080 Special Topics in Performance (1-3) Prereq: Consent of department head.

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

5111 Advanced Harmony (3) Analytic survey of harmonic trends in compositions from 1700 to present. Exercises employing and illustrating these techniques. Prereq: Consent of instructor.

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

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

5121 Analytical Techniques (3) Analytical techniques with emphasis on contemporary approaches. Tonal and neotonal music. Prereq: Consent of instructor.

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

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

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

5210 Introduction to Music Research (3)

5220 Proseminar (3) Research techniques in music emphasizing bibliography, writing of research papers and presentation of oral reports. Prereq: Consent of instructor.

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

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

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

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

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)

**5612 Baroque Ensemble (1)

**5620 UT Singers (1)

**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)

**5670 Symphony Orchestra (1)

**5680 Concert Choir (1)

* May be repeated.
Philosophy

**MAJOR**

**DEGREES**

M.A., Ph.D.

**Philosophy**

**Professors:**

J. W. Davis (Head), Ph.D. Emory; R. B. Edwards, Ph.D. Emory; M. H. Moore (Emeritus), Ph.D. Chicago; D. Van de Vate, Jr., Ph.D. Yale.

**Associate Professors:**


**Assistant Professors:**

J. O. Bennett, Ph.D. Tulane; S. H. Cohen, Ph.D. Northwestern; K. A. Emmett, Ph.D. Ohio State; H. P. Hamlin, Ph.D. Georgia; R. Jones, Ph.D. Chicago; S. Reaven, Ph.D. California (Berkeley).

**THE MASTER'S PROGRAM**

See general requirements on page 19.

Courses below 4000 may not be taken for graduate credit by philosophy majors except with special permission.

**THE DOCTORAL PROGRAM**

Specific requirements for doctoral students in Philosophy include a minimum of three academic years of graduate study involving at least 72 quarter hours credit in course work (normally 24 quarter courses or their equivalent, exclusive of credit for the thesis and dissertation) of which at least 45 shall be in courses numbered over 5000, and of which at least 9 shall be in a subject other than philosophy. The specific number and distribution of courses will be determined by the student's faculty committee. Two foreign languages, normally French and German, are required. As an alternative to the two-language requirement, candidates for the Ph.D. may elect to demonstrate a substantially more advanced proficiency in reading knowledge of one language. Requirements for this option may be obtained in the department office.

In registration any course in the 5000 or 6000 series (except 5050 and 5910-20-30) may be repeated for credit with the consent of the department. That is: courses having the same number, but with different subject matter, may be taken with each separate subject description.

**MEDICAL ETHICS**

The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Details concerning the program can be obtained from the department.

**RELIGIOUS STUDIES**

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

**Departments of Philosophy or Religious Studies.**

3111 Ancient Western Philosophy (4)

3121 Medieval Philosophy (4)

3131 Seventeenth- and Eighteenth-Century Philosophy (4)

3141 Nineteenth- and Early Twentieth-Century Philosophy (4)

3151 Contemporary Philosophy (4) Survey of recent movements in philosophy.

3270 Russian Philosophical and Theological Thought (4) (Same as Religious Studies 3270 and Russian 3270.)

3311-12 American Philosophy (4, 4) 3311—Colonial to late nineteenth century. 3312—Late nineteenth century to present.

3320 Philosophy of Law (4) Nature, sources, function of law.

3330 Philosophy of History (4) Speculative and critical aspects of the philosophy of history.

3410 Philosophical Ideas in Literature (4) Philosophical assumptions and implications in major literary works.

3420 Philosophy of Literature (4) Study of the nature, functions, value and epistemological principles of literary arts.

3430 Concepts of Woman (4) Examination of some of the theoretical foundations of feminism and antifeminism.

3440 Social Ethics (4) Ethical theory as related to politics, economics, law, religion and the family.

3510 Existentialism (4)

3550 Marxism as Philosophy (4)

3650 Philosophy and Religion in India (4) (Same as Religious Studies 3650.)

3660 Buddhist Philosophy and Religion (4) (Same as Religious Studies 3660.)

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.

3770 Introduction to Philosophy of Science (4) Standard topics in philosophy of science: scientific method, nature of laws and theories, principle of induction, explanation, measurement. No background in logic presupposed.

3810 Introductory Symbolic Logic (4) Techniques for formal analysis of deductive reasoning (propositional logic and quantification theory).

3910 Contemporary Aesthetics (4) Philosophical discussion of contemporary art.

4000 Special Topics (4) A student- or instructor-initiated course to be offered at convenience of department. Subject matter to be determined by mutual consent of students and instructor with approval of department. Prerequisites to be determined by department. May be repeated.

4111-21 Modern Religious Philosophies (4, 4)

(3811) (4) Philosophy of Religion (4) (Same as Religious Studies 4111-21.)

4310 Intermediate Ethics (4) Topics in metaethics or ethics.


5610 Recent Developments in Philosophy of Religion (4)

5710 Studies in Metaphysics (4) Metaphysics of philosopher or systematic philosophic tradition.

5810 Social and Political Philosophy (4)

5910-20-30 Research (4, 4, 4) Independent study under direction of member of department.

5950 Clinical Practicum in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

6000 Doctoral Research and Dissertation

6110-20-30 Seminars in the History of European Philosophy (4, 4, 4)

6150 Seminars in the History of American Philosophy (4)

6250 Seminar in the Philosophy of Religion (4)

6310 Seminar in Axiology (4)

6370 Advanced Topics in Medical Ethics (4) Prereq: 5750 or consent of Medical Ethics Committee.

6510 Seminar in Epistemology (4)

6550 Seminar in Philosophy of Science (4)

6850 Advanced Residence in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

Physics and Astronomy

MAJOR DEGREES

Physics M.S., MACT, Ph.D.

Professors: W. M. Bugg (Head), Ph.D. Tennessee; C. R. Bingham, Ph.D. Tennessee; R. D. Binkoff, Ph.D. Northwestern; M. A. Braaznak, Ph.D. Michigan State; T. A. Calvert, Ph.D. Purdue; L. G. Christopoulou, Ph.D. University of Manchester; C. Condo, Ph.D. Illinois; W. E. Dlade, Ph.D. Ohio State; J. B. Dicks; Ph.D. Vanderbilt; J. L. Fowler, Ph.D. Princeton; C. W. Lake, Ph.D. Michigan; N. M. Galler, Ph.D. Ohio State; J. H. Gibbons, Ph.D. Duke; E. G. Harris, Ph.D. Tennessee; D. F. King, Ph.D. Bristol University (England); R. J. Lovell, Ph.D. Vanderbilt; A. A. Mason; Ph.D. Tennessee; A. H. Nierop, Ph.D. Michigan; F. E. Oberhansley, Jr., Ph.D. Pittsburgh; R. D. Present; Ph.D. Harvard; R. H. Ritchie; Ph.D. Tennessee; H. C. Schweinberger, Ph.D. Massachusetts Institute of Technology; J. M. Sellen; Ph.D. Chicago; P. H. Steele, Ph.D. Massachusetts Institute of Technology; J. O. Thomas, Ph.D. Illinois; T. A. Walton, Ph.D. Illinois; J. W. White, Ph.D. North Carolina.

Associate Professors: L. Adler; Ph.D. Tennessee; W. E. Blass, Ph.D. Michigan State; R. W. Childers, Ph.D. Vanderbilt; J. Conde, Ph.D. Colorado State; H. W. Crater; Ph.D. Yale; K. E. Duckett, Ph.D. Tennessee; W. A. Dunlop; Ph.D. Florida; O. C. Eldridge, Ph.D. California (Berkeley); S. Georgi, Ph.D. Manchester (England).


Assist Professors: M. F. Fair, M.S.; M. W. Guidry, Ph.D. Tennessee; T. H. Handler, Ph.D. Rutgers; R. H. Kohl, Ph.D. Ohio State; D. L. McCorkle, Ph.D. Tennessee; R. S. Thoe, Ph.D. Connecticut.

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

A student who enrolls in the Graduate School with the intention of attaining an advanced degree in Physics shall, in general, have completed an undergraduate major in physics or its equivalent. Physics 3210-20-30, 3710-20-30 or 4110-20-30, 4210-20, 4230 or 4240 constitute 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 provide special opportunities for academic and research work in areas pertinent to atmospheric and space flight are available at the Space Institute, Tullahoma.

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

THE MASTER'S PROGRAM

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

The thesis program is primarily designed for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 5110-20-30, 5210-20-30, 5310-20-30 and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

The non-thesis program is primarily designed for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking an M.S. in Physics by this method must apply to the department's graduate committee for permission to follow this program.

The requirements for the M.S. under this method are the satisfactory completion of 45 hours of course work composed of 27 hours from courses numbered above 5000 (4 students 20-30, 5210-20-30, 5310-20-30); 9 hours in a minor field (e.g., mathematics); and 9 hours from other courses in physics numbered above 4000 (preferably of advanced laboratory nature). In addition, the candidate must pass a comprehensive examination administered by the committee.

The Physics Department is also participating in the program which leads to the Master of Arts in College Teaching degree. In addition to the requirements for either of the Master's programs described above, the MACT degree in Physics requires 15 more hours of credit, making a total of 72 quarter hours. Nine of these hours are specified as follows: 3 hours in a seminar course dealing with general problems of college teaching; 3 hours in a seminar course dealing with special problems in the teaching of physics; and 3 hours in a course dealing with the history and philosophy of physics. The other 6 hours of course work may be elected from any of the physics courses numbered above 5000. During the two-year program leading to the MACT degree, the candidate will be continually engaged in supervised teaching activities.

THE DOCTORAL PROGRAM

All students are expected to take Physics 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30 and 6310. Physics 6210-20-30 are normally required of students specializing in nuclear physics. Physics 6500-10 of students in plasma physics, Physics 6610-20-30 of students in health physics, Physics 6710-20-30 of students in solid state physics, and Physics 6810-20 of students specializing in molecular spectra. (The Master's degree is not required.)

A reading knowledge of one foreign language is required. A significant body of literature is required.

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

The thesis topic will be chosen with reference to one of the fields in which research facilities can be made available either at the University laboratory or at the Oak Ridge National Laboratory, Oak Ridge, Tennessee.

A program leading to the Ph.D. in chemical physics is conducted jointly with the Chemistry Department, which offers a similar degree. The requirements for the degree in chemical physics include the successful completion of: Physics 4510, 4610-20-30, 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30, 6210-20-30, 6310 or 5720; Chemistry 4160-70, 5430, and any two quarters from 5340-50, 5460, 5860, 6730 or 6810-20.
Astronomy

Physics
3230 Heat and Thermodynamics (3) Concepts of temperature and heat; laws of thermodynamics; applications of laws to simple physical and chemical problems. Prereq: 2320 or 2330 and calculus; 3210-20 or consent of instructor.
3510-20-30 Physical Measurements (3, 3, 3) Laboratory measurement of some physical quantities; basic techniques where necessary. Prereq: 2310-20 or 2210-20-30, and calculus; 3510 for 3520 and 3530. 3 labs.
3510-20 Electronics (3, 3) Electronic components and circuits of interest to physicists. Prereq: 2310-20 or 2210-20-30, and calculus; 3510 for 3520 and 3530. 3 labs.
3630 Nuclear Electronics Laboratory (3) Elementary circuits of interest in nuclear instrumentation are designed and built, and their characteristics are tested as a function of various parameters. Prereq: 3610-20.
3710-20 Introduction to Atomic and Nuclear Physics (3, 3, 3) 3710—Special relativity and early quantum theory. 3720—Atomic and molecular physics. 3730—Nuclear physics. Prereq: Mathematics 2860 and Physics 2320 for 3710; 3510 or 3710 for 3720-30.
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 calculus majors.
4110-20-30 Introduction to Quantum Mechanics (3, 3, 3) Introduction to fundamental principles of quantum mechanics and methods of calculation. Application to atomic, molecular, and nuclear physics. Prereq: 2330 or equivalent, Mathematics 4550.
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.
4160 Physical Acoustics (4) Considerations fundamental to detailed investigation of any branch of acoustics; propagation of acoustic waves in the intrastronic, the audible, the ultrasonic, and the hypersonic ranges of frequencies. Prereq: 3210-20, 3230. 3 hrs and 1 lab.
4210-20 Electricity and Magnetism (3, 3, 3) Intermediate level electrostatics; steady and alternating currents; laws of electromagnetism; Maxwell's equations; radiation of electromagnetic waves; reflection and refraction; electromagnetic field of an antenna. May be taken in sequence. Prereq: 2230 or 2220 and Mathematics 2860.
4230-40 Modern Optics (4, 4) 4230—Geometrical Optics, the wave nature of light, diffraction at a dielectric interface; paraxial theory of interfaces, lenses, and mirrors: thick lenses, lenses systems: ray-tracing; the image of a lens, spherical aberration. 4240—Physical Optics: Mathematics of wave motion, superposition of waves; interference; Fraunhofer and Fresnel diffraction; Fourier optics; holography. Prereq: 4210 or consent of instructor. 3 hrs and 3 hrs lab.
4510-20-30 Atomic Physics Laboratory (3, 3, 3) Experiments in: fundamental particle properties, photoelectricity, conduction of electricity through gases, atomic and molecular spectroscopy, x-ray. Prereq or coreq: 3710-20-30. 3 labs.
4540-50 Experimental Nuclear and Radiation Physics (4, 4) Interaction of charged particles and electromagnetic radiation with matter: theory and characteristics of various detectors: statistics of counting, nuclear properties. Experiments illustrate recent techniques for investigating the nucleus and nuclear radiation. Prereq: 3210, 1 hr and 6 hrs lab.
4850 Principles of Nondestructive Testing (3) Detection and characterization of discontinuities in materials by nondestructive testing techniques. Ultrasonic, electromagnetic, holographic and penetrating radiation techniques are discussed. Prereq: 2110-20 or consent of instructor.
4710-20-30 Introduction to Health Physics (3, 3, 3) Radioactivity, interaction of electromagnetic radiation with matter, radiation quantities and units, precautions against radiation, x-rays and gamma rays, neutron activation, interaction of charged particles with matter, stopping power, range-energy relations, counting statistics, shielding, dosimetry, waste disposal, critical safety, radiation biology and ecology. Prereq: 3730.
5000 Thesis
5000 Thesis
5080 Graduate Research Participation (3) Advanced research techniques under supervision of staff research. Prereq: 3210-20, 3220-50, 3610-20-30 or 5610-20-30. 3 labs.
5110-20-30 Introduction to Theoretical Physics (3, 3, 3) Classical theoretical physics, with limited use of mathematics. Prereq: 3210-20; 4210-20; advanced calculus, differential equations, and vector analysis.
5210-20-30 Advanced Modern Physics (3, 3, 3) Basic principles of wave mechanics; one-electron atom; vector model; atomic and molecular spectroscopy; molecular binding; relativity; properties of nuclei (spin, magnetic moments, etc.); scattering phenomena; nuclear models and forces; high-energy physics. Prereq: 3210-20, 3710-20-30, 4210-20, differential equations. Must be taken in sequence.
5310-20 Advanced Dynamics (3, 3, 3) Equations of motion; variational principles; two-body problem, rigid body mechanics, special relativity; canonical transformations, normal coordinates, elasticity, fluid mechanics. Prereq or coreq: 5610-20.
5440 Experimental Methods of Infrared and Raman Spectroscopy (3) Experimental equipment; instrumental optics; detection systems; analytical methods. Analysis vibrating-rotating diatomic molecule. Prereq: 3710-20 or equivalent.
5640 Numerical Methods in Physics (3) Numerical methods available for solution of physical problems, pointed toward use of automatic computing machinery; analysis of errors. Prereq: 5610-20-30, or consent of instructor. (Same as Mathematics 5640.)
5720 Physics of Polystatic Molecules (3) Introduction to electronic, atomic, and nuclear processes of luminescence of these molecules; theoretical and experimental aspects of intermolecular and intramolecular electron excitation energy transfer and charge transfer; applications of excitation energy transfer and charge transfer in such fields as organic molecules and molecular reaction and organic scintillations. Prereq: 5210-20 or consent of instructor.
5910-20-30 Special Problems (3, 3, 3) Specially assigned theoretical or experimental work on problems not covered in other courses.
5911-31 Special Problems in the Teaching of Physics (1, 1) Design of physics experiments and demonstrations, construction and analysis of physics tests and examinations, techniques in presentation of physics topics, and related problems. Prereq: Consent of instructor. Required of MACT candidates.
6000 Doctoral Research and Dissertation
6110-20-30 Quantum Mechanics (3, 3, 3) Fundamental principles of quantum mechanics and principal approximation methods. Applications to atomic and molecular spectroscopy; quantum mechanics of one-electron atom; vector model; atomic and molecular spectroscopy; molecular binding; relativistic; properties of nuclei (spin, magnetic moments, etc.); scattering phenomena; nuclear models and forces; high-energy physics. Prereq: 3210-20, 3710-20-30, 4210-20, differential equations. Must be taken in sequence.
5310-20 Advanced Dynamics (3, 3, 3) Equations of motion; variational principles; two-body problem, rigid body mechanics, special relativity; canonical transformations, normal coordinates, elasticity, fluid mechanics. Prereq or coreq: 5610-20.
5410-20 Electromagnetic Theory (3, 3, 3) Advanced, detailed treatment of electrostatics; potential theory. Dielectrics, magnetostatics and steady and quasisteady problems. Magnetic fields of currents and quasi-steady problems. Maxwell's field equations; their solutions in dielectric and con-
ties of gases and solids. Optical properties of electron waves in isotropic media including reflection, refraction and polarization and also theory of diffraction. Prereq: 5410-20-30.

8320 Special Relativity (3) Lorentz transformations; Einstein postulates; relativistic tensors; relativistic mechanics; relativistic electrodynamics. Prereq: 5310-20-30, 5410-20-30, 5810.

8330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prereq: 8320.

8420 Advanced Topics in Classical Theory (3) To meet special needs of students. Possible fields: advanced dynamics and hydrodynamics; electromagnetism; statistical mechanics; theory of nonequilibrium processes. Prereq: 5310-20-30, 5410-20-30, 5510-20-30. May be repeated with consent of department.

8430 Advanced Topics in Quantum Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence; nuclear reaction, electron magnetic susceptibilities, high energy processes, scattering and collision processes, theory of Fermi. Prereq: 6110-20-30. May be repeated with consent of department.

6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) Electrical conduction in gases and plasmas. Characteristics of spark, arc and glow discharges. Collective phenomena in plasma; plasma oscillation: magnetoacoustic waves; instabilities. Topics of current interest in astrophysics, geophysics and thermonuclear research. Prereq: 3710-20-30 and either 37916 or 6110-20-30. (Same as Electrical Engineering 5310-20-30. (Same as Electrical Engineering 6500-10.)

6810 Interaction of Radiation with Gases (2) Interaction of electromagnetic radiation with atomic and molecular gases. Atomic and molecular collision strength, action of charged particles with atoms and molecules; ionization; transcription and light emission; recombination and excitation; electron swarm and electron beam experiments. Prereq or coreq: 6110-20-30.

6820 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; light emission from irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: 6110-20-30.


6810 Vibrational Problems in Molecular Spectra (3) Normal coordinates and potential functions; group theoretical methods and selection rules in gases and condensed phases. Lasers, spectrometry and nonlinear electro-optical phenomena. Prereq: 5420 or equivalent. (Same as Chemistry 6810.)

6820 Molecular Vibration-Rotation Theory (3) Molecules as vibrating and rotating systems possessing quantum mechanics; theory of asymmetric and symmetric molecular vibrations including vibration-rotation interactions, moments of inertia, and energies of molecular transitions; methods of analysis used in high resolution molecular spectroscopy. (Same as Chemistry 6820.)
College of Liberal Arts

3750 The Urban Polity (4) Analysis of political institutions and processes in metropolitan areas.
3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas.
3790 Contemporary Problems of Soviet Foreign Policy (4)

3601 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought.
3802 Studies in Medieval Political Thought (4) From Augustine to Luther; emphasis on problems and theories of religion and politics.
3803 Studies in Early Modern Political Thought (4) Machiavelli through the Enlightenment.
3804 Studies in Nineteenth- and Twentieth-century Political Thought (4) Political theories of industrial and technological societies; nineteenth and twentieth century.
3880 American Political Thought (4) Examination of role of selected political ideas, doctrines, and themes in America, emphasizing their development and relationships to diverse political interests.
4410 Law and the Administrative Process (4) Power, procedures of, controls over administrators.
4535-36 Political Attitudes, Opinions and Communication (4, 4) Nature, development, formation and distribution of politically relevant attitudes and the role of leadership, persuasion, and communication in opinion-policy process.
4540-50 Presidency, Congress and Public Policy (4, 4) The Presidency and Congress within framework of policy-making process.
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.
4573 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.
4610 Budgetary Process (4) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications.
4620 Public Personnel Administration (3) Development of the merit system in government, career systems, public personnel management functions, organization for personnel management.
4665-66 Policy Making in Democracies (4, 4) Comparative approach to theory and process of making public policies.
4675 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.
4711 International Law (4)
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.
4740-50-60 Elections and Politics (3, 3, 3) 4740-50—Nature and function of party system; nominations and campaigns. 4760—Voting behavior of the electorate.
4815 Contemporary Soviet Marxism-Leninism (4) Soviet applications of Marxist-Leninist theory.
4831-32-33 The Systematic Study of Politics (4, 4, 4) Scope, methods and procedures of analysis in political science intended primarily for seniors intending to pursue graduate work and entering graduate students who have not had such a course.
4875 Special Topics in Political Thought (4) May be repeated with consent of department. Maximum 8 hrs.
4940 Politics and the Environment (4) Examination of formulation and implementation of public policies relating to physical environment with emphasis upon water and air pollution control.
4975 Proseminar in Political Science (4) Selected research for seniors; primarily for majors. May be repeated with consent of department. Maximum 8 hrs.
5000 Thesis
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
5101 Foreign Study (1-12) See page 100.
5102 Off-campus Study (1-12) See page 100.
5103 Independent Study (1-12) See page 100.
5110-20 Seminar in Political Theory (3, 3) Selected political thinkers, schools, historical periods.
5140 Politics, Administration and Community in Nonmetropolitan Areas (3) Analysis of problems and processes associated with community development.
5150 Internship in Political Science (3-9) Open to students participating in approved internship programs. May be repeated with consent of instructor. Maximum 9 hrs.
5210-20-30 Seminar in World Politics (3, 3, 3) Research in world politics and organization.
5211 Directed Readings in Political Science (3) May be repeated with consent of instructor and student's advisor. Maximum 9 hrs. May be taken for letter grade or S/NC.
5250 Seminar in African Politics (3) Selected topics in African politics.
5270 Seminar in the Politics of Development (3) Selected topics with political problems of less developed countries.
5310-20 Seminar in Comparative Government (3, 3) Selected topics in modern governments.
5340-50 Seminar in Latin American Government (3, 3)
5370-80 Seminar in Soviet Politics and Government (3, 3)
5410-20 Seminar in Public Law (3, 3) Special problems in constitutional and administrative law.
5440-50 Theory and Analysis of U.S. Foreign Policy (4) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process.
5510-20 Seminar in International Organization (3, 3) 5510—Introduction to regional international organizations; political integration at international level. 5550—Functional international organizations.
5540 Seminar in Comparative Public Administration (3) Approaches to and methods used in comparative analysis.
5550 Seminar in Administration in Developing Countries (3)
5600 Public Administration (3) Public administration theory and functions, approaches to public management, contemporary problems in public administration.
5605 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data.
5610-20 Seminar in Organization Theory (3, 3) Appraisal of major theories of organization and their applicability to public sector.
5611-21-31 Seminar in State-Local Administration (3, 3, 3)
5630 Seminar in Technology and Public Policy (3) Technological change and policy process, government interactions with scientific community, political characteristics of scientific enterprise.
5635-45 Operations Research for Public Administrators (3, 3) Operations research methodology, applications and limitations in public sector; linear programming, transportation and assignment problems, network analysis, PERT, dynamic programming and other methods.
5640-50-60 Seminar in Metropolitan Areas (3, 3, 3)
5814 Seminar in Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor.
5870-80 Seminar in Policy Analysis (3, 3) Role of administrators in policy analysis and decision making with special attention to historical and current issues.
5710 Seminar in the Politics of Administration (3) Examination of problems of formulation and implementation in context of American political system with emphasis upon public policy and political roles of public administrators and agencies.
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.
5760 Seminar in TVA Public Personnel Management Practices (3) Exploration of public personnel management through in-depth examination of one of national government's foremost personnel systems—TVA. TVA staff and employee organization representatives serve as discussion leaders.
5765-75 Law and the Administrative Process (3, 3) Constitutional position; decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice.
5770 Practicum in Public Administration (3)
5780 Seminar in Fiscal Management (3) Fiscal role of government in mixed economy, sources of public revenue and credit, financial planning and control.
5785-95 Seminar in Staff Functions (3, 3) Functions of administrative staff personnel serving political executives, public bureaucracies, legislative bodies, and advisory and community groups in public sector. Selected topics include budgeting, personnel, evaluation, and other staff functions.
5810 The American Political Process (4) Principal patterns of political activity linking citizens and political institutions.
5820 The American Political Process (4) Selected problems in political action.
5850 Seminar in Comparative State Politics (3) Intensive readings in comparative state politics focusing on environment of state politics, institutions and policy making.
5910-20-30 Methodology and Bibliography (3, 3, 3) 5910—Behavioral and mathematical approaches to research. 5930—Philosophical problems in research, traditional literature, and nonbehavioral projects.
6000 Doctoral Research and Dissertation
THE PSYCHOLOGICAL CLINIC

The Psychological Clinic supports graduate training in clinical psychology. Psychological diagnosis and psychotherapy are offered on an outpatient basis, with medical consultants, to the general public as well as to University students, on referral by a physician.

4107 Experience in Individualized Instruction (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4120 Topics in Social Psychology (4) Intensive analysis of selected research topics. Prereq: 3120 or Sociology 3130. (Same as Sociology 4120.)


4239 Laboratory in Sensory Processes and Perception (2) Prereq or coreq: 4230.

4460 Organizational-Industrial Psychology (3)

5150 Personality Theories (4) Prereq: 3650.

5280 Personality and Social Systems (4) Prereq: 2520.

4610 Group Processes (3) Study and experience in the theory and techniques of group processing and facilitation. Those participating in 4610 are expected to continue into 4620 and 4630. Prereq: 3616-26 and consent of instructor.

4620-30 Seminar in Group Processes (3, 3) Didactic and laboratory experience for those qualified for further training in group facilitators. Prereq: 4610 and consent of instructor.

4640 Psychological Tests and Measures (4) Theory and construction of individual and group measures; survey of various methods of assessment of intelligence, personality, special abilities, and educational achievement. Prereq: 3150.

4650 Symbolic Processes (4) Logic of signs and symbols; directed and associative thinking; memory, problem solving, and concept formation; nature, use, and development of language. Prereq: 3210 or consent of instructor.

4660 The Psychology of Language (4) Theories and descriptions of phonology, syntax, and semantics as studied to psychology and related disciplines. Recommended: 4650 or linguistics background.

4710 Physiological Psychology (4) Nervous system and physiological correlates of behavior. Prereq: 1 yr of biology or zoology and 2520.

4719 Physiological Psychology Laboratory (4) Laboratory studies of nervous system and physiological correlates of behavior. Coreq: 4710.

4720 Comparative Animal Behavior (4) Methods and principles. (Same as Zoology 4720.)

4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Zoology 4729.)

4750 Evolution and Ontogeny of Social Behavior (4) Genetic, evolutionary, ecological, and developmental processes as they apply to social organization and dynamics of vertebrates. Prereq: Consent of instructor.

4830 History and Systems of Psychology (4) Prereq: 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.

4880 Afro-American Psychology (4) Review and analysis of psychological literature on Afro-American. Prereq: Consent of instructor. (Same as Black Studies 4880.)

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

5000 Thesis

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

5017 Colloquium in Experimental Psychology (1) Coreq: 5018. S/NC only.

5101-29-39 Laboratory Techniques in Experimental Psychology (3, 3, 3) Required of all first-year students in experimental, physiological, and comparative psychology. Coreq: 5017. S/NC only.

5050 Methods of Research in Applied Psychology (3) Techniques and principles for designing and conducting psychological research in natural settings.

5070 Seminar in College Teaching (2) Concepts, methods, and materials in introduction of psychology at college level. Emphasis on research. Prereq: Consent of instructor. (Same as Education 4620.)

5079 Practicum in College Teaching (2) Supervised participation in college teaching. S/NC only.

5100 Developmental Psychology (3) Prereq: 3550 or Educational Psychology 2430. (Same as Educational Psychology 5100.)

5105 Developmental Assessment (3) Techniques for assessing development in infants and children. Does not include practicum. Prereq: 5100 or equivalent and consent of instructor.

5110 Clinical Aspects of Human Sexuality (3) Nature of sexuality: societal perspectives, personal identity, application, intimacy and isolation including psychosocial and psychosexual identity and models for assessment. Recommended for graduate students in clinical psychology, social work, community and mental health professions. Prereq: Consent of instructor.

5111-12-13 Seminar in Current Issues in School Psychology (1, 1, 1) Historical, legal, ethical and technological issues in practice of school psychology. Multiple instructors. (Same as Educational Psychology 5111-11-12-13.) S/NC only.

5140-50-60 Psychoeducational Assessment (3, 3, 3) Naturalistic, psychometric, and sociometric assessment methods in school learning environments. Must be taken in sequence. Prereq: Admission to School Psychology program or consent of instructor. (Same as Educational Psychology 5140-50-60.)

5149-59-59 Practicum in School Psychology I (2, 2, 2) First-year School Psychology Program practicum core sequence. Coreq: 5140-50-60. (Same as Educational Psychology 5149-59-59.) S/NC only.

5170-80-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 5170-80-90.)

5200 Topics in Developmental Psychology (3) Prereq: 5100 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs.

5210 Readings in Psychology (1) S/NC only.

5220 Readings in Psychology (2) S/NC only.
5580 Theories of Personality (3) S/NC only.

5540 Readings in Psychology (4) S/NC only.

5520 Special Problems in Psychology (1) S/NC only.

5520 Special Problems in Psychology (2) S/NC only.

5520 Special Problems in Psychology (3) S/NC only.

5520 Special Problems in Psychology (4) S/NC only.

5520 Special Problems in Psychology (5) S/NC only.

5319 Field Work in School Psychology: Level I (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to doctoral program in school psychology who are assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 5319.) S/NC only.

5325 Behavioral Interventions (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory as directed by interventions by people in the community (teachers, supervisors, etc.). Includes token economies and strategies for self-control.

5340 Group Dynamics (3) (Same as Educational Psychology 5340.)

*5350-60-70 Seminar in Psychology (3, 3, 3)

5400 Psychophysics and Scaling Methods (3) Prereq: One course in statistics.

5420-30-40 Advanced Psychological Statistics (3, 3, 3) Must be taken in sequence.

5450 Human Problems in Administration (3) (Same as Management 5230.)

5420 Advanced Psychological Statistics (3, 3, 3) Must be taken in sequence.

5450 Human Problems in Administration (3) (Same as Management 5230.)

5490 Continuing Education in Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture; topic and format to be announced. Prereq: Graduate standing or consent of instructor. May be repeated. Maximum 9 hrs.

5500 Fundamentals of Psychometrics (4) Basic ideas and principles of psychometrics. All graduate students who plan to take one or more courses in psychometrics required to take course. Prereq or coreq: 4640.

5510 Instrumentation for Psychological Research (3)

5520 Theory of Mental Measurement (3) Reliability, validity, scaling and equating, norms, combining tests into batteries. Prereq: Descriptive statistics, 4640, and 5500.

5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 5500-70 or equivalent and consent of instructor.

5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, differential psychology, comparison of different populations in specific psychological parameters, individual choice behavior, and testing of psychological hypotheses in human and animal behavior; reliability theory and regression theory. Prereq: 1 qr calcs 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.

5560-70 Seminar in Social Psychology (3, 3) Prereq: 5550. May be used for credit in sociology. May be repeated. Maximum 9 hrs.

5580 Theories of Personality (3)

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 of three major contemporary points of view.

5589 Psychological Techniques Laboratory (2) Basic techniques of psychological appraisal. Restricted to doctoral students in clinical psychology.

5590 Psychodynamics (3) Research and theory focusing on origins of behavior.

5591-92-93 Clinical Psychology II: 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.

5610-20 Psychological Learning of (3, 3) Prereq: 3210 or Educational Psychology 3730.

5650 Ethics in Professional Psychology (2) Review of ethical concerns in professional psychological practice. Must be taken in sequence. Meets 3 hrs per week.

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 symptomaticity 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.

5713 Learning Modules for Techniques in Professional Psychology (1-4) Set of learning packages; each develops skill in assessment, therapy, child or adolescent therapy, or psychology. 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: Introductory biology and graduate standing.

5760 General Vertebrate Neuroanatomy (3) Lecture and laboratory dealing with structure and functions of central and peripheral nervous system. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 5760.)

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.)

5810 Techniques of Psychological Examination (3) Development and administration of basic examination techniques. Primarily intended for graduate students in fields related to psychology using assessment procedures. Prereq or coreq: 4640 or equivalent and consent of instructor.

*5819 Practicum in Techniques of Psychological Examination (2) Coreq: 5810.

5840 Student Appraisal (3) (Same as Educational Psychology 5840.)


5859-60-79 Practicum in Psychological Appraisals (2, 2, 2) Orally to be taken concurrently with 5850-60-70.

5890 Counseling Theories and Techniques (3) (Same as Educational Psychology 5890.)

5900 Theory and Practice of Consultation (3, 3) Issues in consultation, models of consulting process, and evaluation of consulting techniques. Must be taken in sequence. Coreq: 5969 and consent of instructor. (Same as Educational Psychology 5950-60.)

5969-60 Practicum in Consultation (2, 2) Coreq: 5950-60. Must be taken in sequence. (Same as Educational Psychology 5959-69.) S/NC only.

6000 Doctoral Research and Dissertation

6050 Seminar on Methods of Social Research (3) (Same as Sociology 6050.)

6100 Community Psychology (3) Emerging psychological practices in intervention, evaluation and research in community. May be repeated. Maximum 9 hrs.

6150 Seminar in Program Evaluation (3) Techniques for designing and conducting research to evaluate effectiveness of programs. Prereq: Statistics 5250-60-70 or equivalent and consent of instructor.

6210-20-30 History, Systems, and Theories in Psychology (3, 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.

*5310 Seminar in Motivation and Emotion (3)

6310 Field Work in School Psychology: Level II (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to doctoral program in School Psychology assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. Maximum of 6 hrs. S/NC only. Prereq: 5950-60. (Same as Educational Psychology 6319.)

6320 Seminar in Research Methods (3)

6330 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.)

6390 Seminar in Psychotherapy (2) Treatment of current case, focusing upon psychodynamics, psychopathology, and therapeutic techniques employed. Prereq: M.A. in psychology or equivalent.

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 developments in field relevant to their impact on experimentation and systems of thought. Prereq: M.A. in psychology or equivalent.

6405 Seminar in Psychopathology (3) Prereq: Consent of instructor.
Radiation Biology
(Interdepartmental)

MAJOR
Radiation Biology
M.S.; Ph.D.

Daniel Billen, Director

A graduate major in the field of Radiation Biology is offered through the Institute of Radiation Biology. This is a program crossing both departmental and institutional lines. Included on the Institute staff are certain scientists from the Departments of Biochemistry, Botany, Chemistry, Microbiology, Physics, Zoology, and the Memorial Research Center and the Comparative Animal Research Laboratory of The University of Tennessee, the Biology and Environmental Sciences Divisions of the Oak Ridge National Laboratory, and the Medical Division of Oak Ridge Associated Universities.

Formal courses in this program are offered mainly on the Knoxville campus. Thesis research may be carried on either at the University or at one of Oak Ridge laboratories. Problems selected for thesis research shall involve the interaction of radiations or long-lived fission products and radiometric chemicals with biological systems, at the molecular, cellular, organismal or ecological level of complexity. Areas of radiation specialization currently include photobiology, environmental, microbial, botanical, and biochemical and biophysical radiobiology.

ADMISSION REQUIREMENTS

The minimum academic requirements for admission to the Institute are: (1) a Bachelor's degree from an accredited college or university, (2) biological science, chemistry, physics: 30 quarter hours in one and 12 in each of the others, (3) college mathematics: potential candidates for the Master's degree, 9 quarter hours; potential candidates for the doctoral degree, 12 potential and integral calculus, (4) for the Ph.D. program, Graduate Record Examination scores.

THE MASTER'S PROGRAM

Course requirements include:
(1) Zoology 5610, (2) Zoology 5620 or 5770 or 5780, (3) Zoology 5350 or Plant and Soil Science 3610, (4) Chemistry 3810, (5) Biochemistry 4110-20 or 5610-20-30. (At least one-half of the student's program must be at the 5000 level.) A thesis is required of all students.

THE DOCTORAL PROGRAM

(1) Courses: In addition to those required for the Master's degree, Chemistry 4910-20-30; Physics 3710-20-30 (Chemistry 3810 may be substituted for Physics 3730); Radiation Biology 5620; 5780. Additional course requirements are determined by the student's faculty committee. The student's special field of interest and plans for a career determine these requirements. The more important courses from which selection may be made are advanced courses in biochemistry, botany, chemistry, electrical engineering, mathematics, microbiology, physics, and zoology. Courses are available for the M.S. and Ph.D. degrees.

THE DOCTORAL PROGRAM

(1) Courses: In addition to those required for the Master's degree, Chemistry 4910-20-30; Physics 3710-20-30 (Chemistry 3810 may be substituted for Physics 3730); Radiation Biology 5620; 5780. Additional course requirements are determined by the student's faculty committee. The student's special field of interest and plans for a career determine these requirements. The more important courses from which selection may be made are advanced courses in biochemistry, botany, chemistry, electrical engineering, mathematics, microbiology, physics, and zoology. Courses are available for the M.S. and Ph.D. degrees.
THE MASTER OF ARTS PROGRAM

1. Completion of 45 quarter credits of graduate work. Students must pass a preliminary examination covering the major and minor fields. This examination, both written and oral, is to be held at the time deemed most appropriate by the Committee. An official candidate for the degree shall be passed before a student can become an official candidate for the degree. This preliminary examination is to be held at the time deemed most appropriate by the student's major advisor and committee. The candidate is expected to defend the dissertation in a final oral examination.

2. Written and oral fluency in Spanish as well as knowledge of two other foreign languages. One of these must be French; the second one should be chosen from such languages as German, Italian, Portuguese, Arabic or Hebrew in accordance with the student's field of concentration. Proficiency in Latin shall be required of all students specializing in an area related to philology or the medieval period.

Examinations:
A preliminary comprehensive examination, both written and oral, covering the major and minor fields must be passed before a student may become an official candidate for the degree. This preliminary examination is to be held at the time deemed most appropriate by the student's major advisor and committee. The candidate is expected to defend the dissertation in a final oral examination.

For additional information on the program, consult pages 21-22.

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 84 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 4000. In addition, 9 hours may be taken in courses of the 4000 level and the rest in courses above 5000. All students must complete the series in methodology (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 balanced 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 fluency in Spanish as well as knowledge of two other foreign languages. One of these must be French; the second one should be chosen from such languages as German, Italian, Portuguese, Arabic or Hebrew in accordance with the student's field of concentration. Proficiency in Latin shall be required of all students specializing in an area related to philology or the medieval period.

Examinations:
A preliminary comprehensive examination, both written and oral, covering the major and minor fields must be passed before a student may become an official candidate for the degree. This preliminary examination is to be held at the time deemed most appropriate by the student's major advisor and committee. The candidate is expected to defend the dissertation in a final oral examination.

For additional information on the program, consult pages 21-22.

Arabic

3510-20 Intermediate Modern Standard (4, 4)
3610 Islamic Literature in English Translation (4) Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian, and Turkish. Recommended readings include The Arabian Nights, The Rubaiyat of Omar Khayyam and Gibran's The Prophet.
5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) (Same as Spanish 5070-80-90.)
5101 Foreign Study (1-12) See page 100.
5102 Off-campus Study (1-12) See page 100.
5103 Independent Study (1-12) See page 100.

French

3010-23-30 Elements of French for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations. Not open to students desiring reading knowledge of the language. Undergraduate credit only. No credit for those having had Elementary French. No auditors.
5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department.

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as Italian and Spanish 5151-61-71). S/NC only.

5210-20-30 French Literature of the Sixteenth Century (3, 3, 3)

5350-60-70 The Philosophes (3, 3, 3) Textual analysis of the works of Voltaire, Diderot, Rousseau, and other eighteenth-century writers.

5410-20-30 The French Novel (3, 3, 3)

5450-60 Lyric Poetry of the Nineteenth Century (3, 3, 3) 5450—German and English Influences on French Romanticism and generation of the poets of “le mal du siecle.” 5460 —Victor Hugo; the Parnassians.

5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and Petits poemes en prose with emphasis on the theories of color and “correspondances” and their influence on Symbolist school.

5510-20-30 Trends in Contemporary French Literature (3, 3, 3)

5560-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories.

5670 Problems in Romance Linguistics (3) Topics vary. May be repeated with consent of department. Prereq: 4270 or equivalent. (Same as Spanish 5670.)

5710-20-30 Seminar in French Literature (3, 3, 3) Topics vary. May be repeated with consent of department. 

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as Spanish 5910.)

Italian

3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian or equivalent.

3310-20-30 Italian Literature in English Translation (3, 3, 3) 3310—Italian School, the Flor- entine School, Dante, Petrarch, Boccaccio, Machiavelli, Ariosto, Tasso. 3320—From the Baroque through nineteenth century, commedia dell’arte, Vico, Leopardi. 3330—Twentieth century, Carducci, Pirandello, Quasimodo, D’Annunzio, Moravia. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs.

3510-20 Aspects of Italian Literature (4, 4) Prereq: Intermediate Italian or equivalent. Recommended for literature majors.

4010-20 Italian Drama in English Translation (3, 4, 4) 4010—La commedia dell’arte and major works of Machiavelli, Metastasio, Goldoni, Goldoni. 4020—Twentieth-century theatre: operatic drama, the Grottesco, Pirandello, De Filippo, Frati. 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.

4050-60-70 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 4050-60-70.)

4220 Petrarch (3) Prereq: 3130, 3520 or equivalent.

4230 Boccaccio (3) Prereq: 3130, 3520 or equivalent.

4330 History of Italian Language (3) Prereq: 3130, 3520 or equivalent.

4410-20-30 Literature of the Rinascimento (3, 3, 3) From Pulci to Tasso, the Quattrocento and the Cinquecento. Prereq: 3130, 3520 or equivalent.

4390 The Modern Novel (3) Prereq: Intermediate Italian or equivalent.

4540 The Modern Theatre (3) Prereq: Intermediate Italian or equivalent.

4610 Contemporary Theatre (3) Prereq: Intermediate Italian or equivalent.

4620 Contemporary Poetry (3) Prereq: Intermediate Italian or equivalent.

4630 Contemporary Prose (3) Prereq: Intermediate Italian or equivalent.

5011 Techniques in Literary Analysis (2) Intensive course in explication de texte.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Spanish 5151-61-71). S/NC only.

5610-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department.

5710-20 Seminar in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department.

Portuguese

3510-20 Aspects of Portuguese Literature (4, 4) Prereq: Intermediate Portuguese or equivalent. Recommended for literature majors.

4220-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) May be repeated with consent of instructor.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

Spanish

4030 Masterpieces of Spanish Literature in English Translation (3) No foreign language credit.

4050-60-70 Hispamica Literature and Culture (3, 3, 3)

4110-20-30 Spanish Literature of the Golden Age (3, 3, 3) 4110-20-Twentieth-century theatre: operatic drama, the Grottesco, Pirandello, De Filippo, Frati. 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.

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent.

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent.


4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent.

5101 Foreign Study (1-12) See page 100.

5102 Off-campus Study (1-12) See page 100.

5103 Independent Study (1-12) See page 100.

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.” 5460 —Victor Hugo; the Parnassians.

5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and Petits poemes en prose with emphasis on the theories of color and “correspondances” and their influence on Symbolist school.

5510-20-30 Trends in Contemporary French Literature (3, 3, 3)

5560-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories.

5670 Problems in Romance Linguistics (3) Topics vary. May be repeated with consent of department. Prereq: 4270 or equivalent. (Same as Spanish 5670.)

5710-20-30 Seminar in French Literature (3, 3, 3) Topics vary. May be repeated with consent of department. 

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as Spanish 5910.)

Italian

3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian or equivalent.

3310-20-30 Italian Literature in English Translation (3, 3, 3) 3310—Italian School, the Flor- entine School, Dante, Petrarch, Boccaccio, Machiavelli, Ariosto, Tasso. 3320—From the Baroque through nineteenth century, commedia dell’arte, Vico, Leopardi. 3330—Twentieth century, Carducci, Pirandello, Quasimodo, D’An- nunzio, Moravia. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs.

3510-20 Aspects of Italian Literature (4, 4) Prereq: Intermediate Italian or equivalent. Recommended for literature majors.

4010-20 Italian Drama in English Translation (3, 4, 4) 4010—La commedia dell’arte and major works of Machiavelli, Metastasio, Goldoni, Goldoni. 4020—Twentieth-century theatre: operatic drama, the Grottesco, Pirandello, De Filippo, Frati. 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.

4050-60-70 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 4050-60-70.)

4220 Petrarch (3) Prereq: 3130, 3520 or equivalent.

4230 Boccaccio (3) Prereq: 3130, 3520 or equivalent.
5100 Thesis
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5111 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. An intensive course in explication de texte.

5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) 5070—General culture history, philosophy in Arab Spain. 5080—Development of traditional Arabic poetry and popular narrative, into modern novel of character after invention of printing. 5090—Mutual influence of traditional Arabic poetry and popular narrative, into modern novel of character after invention of printing.

5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department.

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French 5151-61-71) S/NC only.

5211-21 Don Quijote (3, 3) Must be taken in sequence.

5212-22-23 Spanish Lyric Prose (3, 3, 3) 5212—La Celestina; critical study of Fernandez de Rojas's life and work. Celestinesque genre; Feliciano de Silva's Segunda Celestina. 5222—Spanish philosophical thought; mystical prose; satirical works. 5232—Guzman de Alfarache and Spanish picaresque genre.

5231 The Exemplary Novels, Persiles y Sigismunda (3)

5250-60 The Generation of '98 (3, 3) Angel Ganivet, Giner de los Rios, Baraja, Unamuno, Valle Inclan, Benavente, Azorin, Perez de Ayala.

5270 The Contemporary Novel (3) Civil War and post-Civil War period.

5310-20 Directed Readings (3, 3)

5311-21 Special Topics in Spanish or Spanish American Literature (3) May be repeated.

5340 Problems in Hispanic Culture (3) Prevailing social, political, artistic, literary and ideological conditions and patterns of any area or period within Spanish or Latin American culture. May be repeated with consent of department. Maximum 6 hrs.

5510-20-30 The Spanish Theatre after the Golden Age (3, 3, 3) 5510—From eighteenth century through Romanticism. 5520—From Realism through Generation of 1898. 5530—Contemporary theatre.


5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay.

5611-21 Spanish American Lyric Poetry (3, 3)

5620-30 The Modern Novel in Spanish America (3, 3)

5631 Spanish American Essay (3)

5632 The Spanish American Short Story (3) Short story as major literary genre in Spanish America. Reading and criticism of works of authors such as Dario, Quiroga, Borges, Arreola, and Rufio.

5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos, Sorzano, Rodolfo Ugijar, Conrado Naiche, Roberto Cossa, Rene Marques and Sebastian Salazar Bondy. Presentation of films as adaptations of works such as Dolores Barba, Los de abajo and Don Segundo Sombra as well as exponents of experimental cinema of today.

5640 Latin American Women Writers (3) Feminine point of view, modern image of woman, male-female relationships and society as context for woman's destiny. Readings from poetry and fiction, including such authors as Alfonsina Storni, Delmira Agustini, Gabriela Mistral, Silvina Arias, Silvina Bullrich, Silvina Ocampo, and Rosario Castellanos.

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in compositions, sketches, and original stories.

5670 Problems in Romance Linguistics (3) (Same as French 5670.)

5810-20-30 Spanish Lyric Poetry (3, 3, 3)

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as French 5910.)

6000 Doctoral Research and Dissertation

6210-30 Seminar in Spanish Literature (3, 3, 3) Topics vary in field of Peninsular literature. May be repeated with consent of department.

6310-30 Seminar in Latin American Literature (3, 3, 3) Topics vary. May be repeated with consent of department.

Russian

See German

Sociology

MAJOR

DEGREES

Sociology

M.A., M.A.T., Ph.D.

Professors:

R. R. Pool (Head), Ph.D. North Carolina; J. A. Black, Ph.D. Iowa; D. J. Champion, Ph.D. Purdue; W. E. Cole (Emeritus), Ph.D. Cornell; L. Ebersole, Ph.D. Pennsylvania; S. Wallace, Ph.D. Minnesota.

Associate Professors:

D. M. Zett, Ph.D. Michigan State; D. C. Elliot, Ph.D. Michigan State; D. Hastings, Ph.D. Massachusetts; T. C. Hood, Ph.D. Duke; R. C. Perre, Ph.D. British Columbia; N. Sharav, Ph.D. Illinois.

Assistant Professors:


For a full statement of departmental requirements, students are referred to the Departmental Manual. All registration for 3000- and 4000-level courses require the consent of the instructor.

THE MASTER'S PROGRAM

The department offers both a thesis and non-thesis option for a Master's degree. For information concerning the Master's degree with thesis, see the General Requirements on page 19. Those interested in the non-thesis option should obtain details from the department.

THE DOCTORAL PROGRAM

General requirements for the degree of Doctor of Philosophy are described on page 21. Additional specific requirements for the degree of Doctor of Philosophy in Sociology include:

1. A minimum of 108 credit hours following the Bachelor's degree, exclusive of credits for the Master's thesis, is required. Of this number, 36 hours shall be allocated to doctoral research and dissertation. A maximum of 12 hours credit outside the major may be taken in related fields, with the approval of the student's committee. Exclusive of doctoral research and dissertation at least one-half of all credits shall be in courses numbered 5600 or 6000.

2. A written preliminary examination covering sociological theory, research methodology, and two other areas in sociology must be passed prior to admission to candidacy. This examination must be passed not later than one academic year before the date on which the degree is granted.

3. No later than one month before granting of the degree, the candidate will be required to pass an oral examination on the doctoral dissertation. At the oral examination the candidate will be expected to show a thorough knowledge of sociological theory and methodology related to the research.

4030 Society and Law (4) General treatment of social origins and consequences of law and legal process. Particular emphasis is placed on problems of law and social change, and on structure and functioning of legal sanctions. Some attention is paid to law and law-like phenomena in formal organizations and primitive societies.

4110 Population Problems (4) Demographic factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.

4120 Topics in Social Psychology (4) (Same as Psychology 4120.)

4130 Sociology of Punishment and Corrections (4) Traces development of correctional movement, develops a critical sociological perspective on contemporary correctional programs, and provides overview of evaluative research in correction.

4310 Criminology (4)

4330 Urban Ecology (4) Examination of public, private, voluntary, and community groups. Classi-

cal school of ecology, its neoclassical reviewers, sociological analysis, and cognitive symbolic ecological approaches.

4410 Educational Sociology (3) (Same as Curriculum and Instruction 4410.)

4530 Community Organization (4) Structure; function; linkages; change and development and
important community studies are reviewed and discussed. Emphasis on sociological analysis, not on the implementation of change.

4540 Social and Religious Change (4) Critical review of historical and contemporary theories and methods employed in studying social change. Attention given to both macro and micro group change. (Same as Religious Studies 4540.)

4605 Formal Organization (4) Analysis of bureaucratic process, division of labor, delegation of authority, and goal-directed communication under a system of rationality.

4820 American Minority Groups (4) Minority groups and social structure in American society; analysis of intergroup relations with attention given to both past and present relationships of selected groups to broader society.

4930 Social Movements (4) Development, organization, and function of social movements; attention is given to the ideology, leadership and organization of political, religious and other types of social movements.

4940 Sociology of Religion (4) Interrelationship of society, culture, and religion. (Same as Religious Studies 4940.)

4960 Tradition, Change and Modernity in Asia (4) (Same as Religious Studies 4960.)

5000 Thesis

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

5040 Methodological Issues in Social Research (3)

5050 Seminar in Political Sociology (3) Systematic study of societal, organizational, and group perspectives.

5060-70 Special Social Investigation (3, 3) Directed readings and/or research projects.

5200 Seminar in Collective Behavior and Social Movements (3)

5210, 5420-30 Social Theory (3, 3, 3)

5220 Social Control (3)

5230 Seminar in Sociology of Medicine (3)

5240 Theory and Research in Human Migration (3)

5250 Selected Topics in Migration Research (3)

5310 Seminar in Methods of Sociological Research (3) Major methodological issues in sociology; scaling techniques; reliability, validity, sampling, and qualitative methodology.

5320-30 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.

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 community settings.

5560-70 Field Research in Deviance (3, 3)

5580 Sociology of Mental Disorders (3) Relationship between mental disorders and subjective theories of mental illness. Historical development of theoretical conceptualizations. Interdependence of theory and therapeutic techniques. Epidemiology of mental disorders. Review of major studies.

5590 Social Differentiation and Stratification (3) Various sources of differentiation in society, their relation to conflict in society, and their relationship to class structure in society.

5610 Seminar in Occupations (3) Occupations and their relation to individual and society; technology and occupations; unequal rewards and occupations; social organization and occupations.

5620 Seminar in Occupations (3) Continuation from material in Sociology 5610; interface between occupations and settings in which they are performed.

5630 Seminar in Occupations (3) Research participation: directed projects on subjects developed in 5620. Prereq: 5610 or 5620.

5640 Social Structure and Personality (3) Social interaction and personality; genetics and functioning of self; cultural basis of personality. May be used for credit in psychology.

5670 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5720 Small Group Theory and Research (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to test selected theoretical problems. May be repeated.

5730 Seminar in Research Problems in Inter-group Relations (3) Research techniques in 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 race, culture, and social policy related to these problems and recent psychological and sociological research are discussed. May be repeated. Prereq: 5810.

5820 Seminar in Social Statistics (3) General survey of statistical procedures used in research and current position of theory.

5840 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delinquency, research findings related to them, and their implications for social control and rehabilitation.

5950 Seminar in Population Theory (3) Mathus, Marx, optimum population, and selected variables are examined. Prereq: 4110.

5960 Demographic Techniques (3) Life tables, standard rates, and survey techniques of population analysis.

5970 The SocioLOGY of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Relations between urbanization, industrialization, and modernization.

6000 Doctoral Research and Dissertation

6040 Experimental Research (3)

6050 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychology 6050.)

6070 Field Research (3)


6090-100 Survey Design and Analysis (3, 3) Application of general methodological principles to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtr's).

6130 Seminar in Mass Behavior and Related Topics (3)

6140 Advanced Reading in Sociological Theory (4)

6150 Advanced Reading in Sociological Methods (4)

6160 Advanced Special Social Investigation (4)

6170 Cross-cultural Aspects of Human Fertility (3) Conflict, topical, regional, and methodological approaches to human fertility and demographic problems. Consideration of relations obtained between socioeconomic and demographic change in various parts of world; fertility rates and national power; controversies on control of vital rates of growth.

6180 Theory and Method of Human Ecology (3) Theoretical perspective and research techniques of human ecology applied to selected research sites.

6190 Advanced Special Social Investigation (4)

6510 Advanced Issues in Criminological Theory (3) Emphasis on problems related to theory construction and measurement.

6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding cause and procedures and programs for social control. Prereq: 4510 and 5520.

6530 Sociology of Law (3) Analysis of social and cultural factors influencing emergence and maintenance of law as social institution and affecting relations between law and deviant behavior; appraisal of theoretical and methodological issues encountered in studying law.

6540 Readings in Criminology and Deviance (3) Directed readings and selected topics on criminology and deviance.

6550 Advanced Studies in Community (3) Analysis of concepts of community, theories of community change, and techniques used in community research.

6610 Seminar in Formal Organization (3) Major methodological issues; theories; bureaucratic functions; organizational research; organizational authority patterns; communication in formal organizations. Prereq: 3160-20.

6710 Seminar in Class and Status (3) Classic and current studies of class and status. Methods used in research and current position of theory.

6910 Advanced Studies in Social Psychology (3) Social interaction and personality; genesis and functioning of self; interplay of social structures and individual actions; theories of social psychology related to these problems and current research are discussed. May be repeated. Prereq: 3130 or 5640 or Psychology 5950.

6940-50 Social Change (3, 3) Major theories, methods and research.

6940 Advanced Studies in Urban Sociology (3) Field work projects; community studies examined and/or applied in specified areas. Prereq: 3140-20.

Spanish
See Romance Languages

Speech and Hearing Sciences
See Audiology and Speech Pathology

Speech and Theatre

MAJOR DEGREE

Speech and Theatre

M.A.

Professors:


Associate Professors:

4591 Persuasive Uses of Imaginative Literature (4) Topics in social and political uses of novels, plays, and poems. Prereq: Consent of instructor.
4811 Advanced Phonetics (4) Phonetic aspects of contemporary dialects of the English language. Prereq: Consent of instructor.
4991-21 History of American Public Address (4, 4) 4991-Colonial period to 1865. 4921—1866 to present. Prereq: Consent of instructor.
4999 Colloquium in Speech Communication (1) May be repeated.
5140 Communications Theory (3) Analysis of contemporary theories of human communication, emphasizing similarities and differences of communication processes in interpersonal, personal, and mass communications systems. (Same as Communications 5140.)
5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs.
5220 Quantitative Projects in Speech Communication (3) May be repeated. Maximum 9 hrs.
5430 Studies in Tennessee Oratory (3) May be repeated. Maximum 9 hrs.
5440 Organizational Communication (3) May be repeated. Maximum 9 hrs.
5550-80-70 Studies in Persuasion (3, 3, 3)
5750-57-60 Studies in Rhetoric (3, 3, 3)
5911 Directing the Forensic Program (4) Philosophical and educational models of directing and organizing forensic activities in high schools and college. Prereq: Consent of instructor. (Same as Curriculum and Instruction 5911.)

Speech and Theatre
4170-80-90 Film History and Theory (3, 3, 3) Analysis of cinematic forms and styles. 4170—Narration. 4180—Exposition and persuasion. 4190— Experimental forms; films and other media.
4640 Group Performance of Literary Work (4) Oral interpretative techniques of choral reading, readers theatre and chamber theatre.
5000 Thesis
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
5110 Introduction to Graduate Research in Speech and Theatre (3)
5120 Directed Reading and Research (3) May be repeated. Maximum 9 hrs.
5160 Theory and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. May be repeated. Maximum 8 hrs.

Theatre
3121-22 Advanced Acting (4, 4) Historical styles of acting. 3121—Renaissance. 3122—seventeenth and eighteenth centuries. Prereq: Consent of instructor.
3151 Theatre Practicum: Performance (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor.
3152 Theatre Practicum: Production (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor.
3153 Outdoor Repertory Productions (4) Supervised work on productions at Hunter Hills Theatre. Available only to members of summer company by consent of instructor.
3214-15 Technical Theatre (4, 4) Special techniques of scenic painting, properties, costume design and construction, stage management; problems in technical theatre practice. Prereq: 2211-21; or consent of instructor. Must be taken in sequence.
3231-32 Introduction to Scene Design (4, 4) 3231—Problems in stage design with reference to form and space, movement, scale, and style; rudiments of rendering and groundplan preparation. 3232—Play interpretation through scenic means; setting as environment for dramatic action; rudiments of model-making. Must be taken in sequence.
3252-53-54 History of the Theatre (4, 4, 4) Drama in performance with particular emphasis on theatre architecture, scene design, and acting styles from their beginnings to 1900. 3252—The European Theatre, 1650-1850. 3254—Modern Theatre.
3262-63 History of American Theatre (3, 3) Development of theatre as social institution in American life. 3262—from its beginnings to 1900. 3263—from 1900 to present.
3271-22 Introduction to Lighting Design (4, 4) Mechanics of stage lighting; elementary theory; problems in basic light design. Prereq: 2211-21 and consent of instructor. Must be taken in sequence.
3451-52 Play Directing (4, 4) Must be taken in sequence. Prereq: 2211.
3511-12 Introduction to Costume Design (4, 4) Costumes as an expression of character or as a means of the application of costume history to specific design projects. Prereq: 2231 or consent of instructor.
4133-34 Special Problems in Acting (3, 3) Advanced exercises in voice and movement; preparation of major role under performance conditions. Prereq: 3121-22 and consent of instructor.
4151 Theatre Practicum: Performance (1-4) Continuation of 3151. Available for credit only to theatre majors. Prereq: Consent of instructor.
4152 Theatre Practicum: Production (1-4) Continuation of 3152. Available for credit only to theatre majors. Prereq: Consent of instructor.
4153 Outdoor Repertory Productions (4) Continuation of 3153. Available only to members of summer company by consent of instructor.
4214-15 Advanced Technical Theatre (4, 4) Advanced technical theatre management; advanced scenic, properties, and costume construction; special problems in technical theatre.
4241-42 Advanced Scene Design (4, 4) 4241—Descriptive drawing as an approach to three dimensional design; theatrical graphic standards and preparation of design drawings. 4242—Perception of surface color; construction of spatial illusion through color with reference to rendering, scene painting, and preparation of painter's elevations. Must be taken in sequence. Prereq: 2211-21, 3211-22 and consent of instructor.
4341-42 Advanced Lighting Design (4, 4) Relationship of light to setting in creating stage environment. Prereq: 3321-22 and consent of instructor. Must be taken in sequence.
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.
4541-42 Advanced Theatre Costume Design (4, 4) Advanced problems in costume design and construction; pattern drafting; draping. Prereq: 3511 or 3512.
4751-52 Dramatic Theory and Criticism (3, 3) 4751—Theatre aesthetics. 4752—Dramatic theory.
4951-52 Playwriting (4, 4) Prereq: Consent of instructor.
5011-12-13 Projects in Lieu of Thesis (3, 3, 3)
5280 Seminar in Playwriting (3)
5310 Studies in European Theatre History (3) May be repeated. Maximum 9 hrs.
5320 Studies in American Theatre History (3) May be repeated. Maximum 9 hrs.
5820 Projects in Lighting Design (3) May be repeated. Maximum 9 hrs.
5830 Projects in Play Directing (3) May be repeated. Maximum 9 hrs.
5840 Projects in Scene Design (3) May be repeated. Maximum 9 hrs.
5850 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.
5860 Projects in Technical Theatre (3) Problems of set design, interpretation, and execution.
5670-71-72-73-74-75 Master Class in Acting (5, 5, 5, 5, 5, 5)
5860-81-82 Design and Technical Theatre Seminar (6, 6, 6)
5890 Projects in Theatrical Production (3) May be repeated. Maximum 9 hrs.
5950-60-70 Studies in Dramatic Theory and Criticism (3, 3, 3)

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) Prereq: Consent of instructor. May be repeated. Methods for directing high school dramatic programs. (Same as Curriculum and Instruction 5912.)
5950-60-70 Studies in Dramatic Theory and Criticism (3, 3, 3)

Zoology

MAJOR DEGREES
Zoology M.S., Ph.D.

Professors:
J. D. Flench (Head), Ph.D. Brown; R. M. Bagby, Ph.D. Illinois; D. L. Burns, Ph.D. Oklahoma State; J. G. Carlson (Emeritus), Ph.D. Pennsylvania; A. C. Cole, Jr. (Emeritus), Ph.D. Ohio; J. C. Daniel Jr., Ph.D. Colorado; D. A. Ebner, Ph.D. Minnesota; R. G. Frear, Ph.D.; Minnesota; R. F. Grell, Ph.D. Tennessee; B. Hochman, Ph.D. California (Berkeley); J. C. Howell (Emeritus), Ph.D. Cornell; K. W. Jeon, Ph.D. London (England); A. M. Jones, Ph.D. Virginia; J. R. Kennedy, Ph.D. Iowa; J. N. Liles, Ph.D. Ohio State; L. E. Roth, Ph.D. Chicago.


Associate Professors:
K. D. Burnham, Ph.D. Iowa; A. C. Eckert, Ph.D. Kansas; A. A. El-Banna, Ph.D. Washington State; D. J. Fox, Ph.D. Hilton; A. M. Jungreis, Ph.D. Minnesota; J. A. McCabie, Ph.D. California (Davis); M. L. Pan, Ph.D. California (Davis); Ph. D. Wisconsin; G. A. Vaughan, Ph.D. Duke; H. R. Weich, Ph.D. Florida; M. C. Whiteside, Ph.D. Indiana.

Assistant Professors:
K. Foresman, Ph.D. Idaho; E. Frederick, Ph.D. Northwestern; H. N. Gentry, Ph.D. Rutgers; M. A. Handel, Ph.D. Kansas State.

The Department of Zoology offers the Master of Science and Doctor of Philosophy degrees with concentrations in aquatic biology and ecology, cell biology and radiation biology, physiology, genetics, organismal and field biology, and reproduction and developmental biology.

Requirements for admission: Applicants for graduate study are expected to have a background no less extensive than that required of undergraduate majors in this department. This includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are: (1) general zoology or general biology, 12 quarter or 8 semester hours; (2) upper division zoology, 18 quarter or 12 semester hours; (3) chemistry, two years including 12 quarter or 8 semester hours of general inorganic; (4) mathematics, 9 quarter or 6 semester hours including differential and integral calculus; (5) physics, 12 quarter or 8 semester hours; (6) Graduate Record Examination scores (Verbal, Quantitative and Advanced Biology); and (7) a grade point average of 3.0 out of a possible 4.0. Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the Graduate Affairs Committee.

A course in biostatistics is required of all candidates for an advanced degree in Zoology.

All aspirants for advanced degrees in Zoology must exhibit competency in four (M.S.) or five (Ph.D.) of six areas of zoology as determined by a comprehensive examination. Students must take this examination during the fall quarter of the first year and may repeat the examination the following fall quarter if unsatisfactory scores are received. Competency must be exhibited within this two-year period for a student to continue in the program.

Preparation for thesis or dissertation: During the first year a written examination and a special research problem in each of two faculty members' laboratories will determine the student's preparation for thesis or dissertation study.

THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee; (2) the preliminary examination will be an oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizeable literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a B in 3030 language courses. This requirement for the first language must be fulfilled before the student can take the preliminary examination.

The student's faculty committee may require 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.

3040 Natural History of the Vertebrates (5) Behavior, life history, phylogeny, and classification. 3 hrs and 2 labs or field periods.

3050 Comparative Vertebrate Embryology (5) Developmental morphology of selected vertebrates. 2 hrs and 3 labs.

3060 Comparative Vertebrate Anatomy (4) Anatomy of organ systems. Dogfish shark and cat used in laboratory. 2 hrs and 2 labs.


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.

3150 Invertebrate Zoology (5) Biology of invertebrates (except insects) with emphasis on ecology and behavior. Prereq: Biology 3130. 3 hrs and 2 labs.

3220 Physiology of Reproduction (3) (Same as Animal Science 3220.)

3230 Histology (4) Study of animal tissues. Prereq: Biology 3120. 2 hrs and 2 labs.

3410 Bioethics (3) Relationship between biologi- cal disciplines and human values. Open discussion of selected dilemmas arising from new knowledge about medicine, behavior, resources, and technology.

4007, 4010-4017 Minicourse in Zoology (2 hrs each) Selected, advanced topics in zoology, concentrated in time and subject matter. Consult departmental listing for actual topics offered. Prereq: As posted. May be repeated.

4050 Developmental Biology (4) Experimental morphogenesis, fertilization, cellular interactions, hormonal effects and related topics with examples drawn primarily from invertebrates and vertebrates. Prereq: 3050. 2 hrs and 2 labs.

4120 Undergraduate Research Participation (2) Experience in active research projects under supervision of staff members. Prereq: Consent of instructor.

4140 Practicum in Zoology (1-3) Participation in practical application of zoology in community institutions, government organizations and industry. Approximately 5 hrs involvement per week. Prereq: Biology 3110, 3120, 3130 and senior standing.

4190 Mammalogy (4) Classification, evolution, distribution, reproduction, populations, and behavior. 2 hrs and 2 lab or field periods.

4200 Ichthyology (5) Classification, collection and identification, distribution, life histories, and economic importance of systems of animals including man. Prereq: Biology 2130 or consent of instructor. 2 hrs and 2 lab or field periods.
4619-29 Comparative Animal Pathology Laboratory (2, 2) 4619—Cell and tissue changes. 4620—Organ system, and organism changes. Coreq: 4610-20.

4660-70 Limnology (4, 4) 4660—Effects of origin, age, and location of lakes on their physical and chemical nature. 4670—Lake communities, productivity and pollution. Prereq: Chemistry 1110-30 and Biology 3130. Recommended: Botany 1110-20 and 3100, 2 hrs and 2 labs (4660); 3 hrs and 1 lab (4670). Must be taken in sequence, except with consent of instructor.

4700 Arachnology (4) Biology of spiders, mites, scorpions, and relatives. Prereq: 3110, or 3150. 2 hrs and 2 labs.

4720 Comparative Animal Behavior (4) Methods and principles. (Same as Psychology 4720.)

4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Psychology 4729.)

4810-20-30 Insect Morphology and Taxonomy (4, 4, 4) 4810—Internal morphology of both generalized and specialized forms. 4820—Taxonomy of major orders. 4830—Taxonomy of minor orders and immature forms. Prereq for 4820-30: 3110 or consent of instructor. 2 hrs and 2 labs.

4940 Physiology of Exercise (4) Functions of body in muscular work; physiological aspects of fatigue, training, and physical fitness. Prereq: 2920-30 or 3080. 3 hrs and 11 lab.

5000 Thesis

5080 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director whose research area coincides with interests of student. Open to advanced research techniques studied under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. S/NC only.

5110-20-30 Special Problems (2, 2, 2)

5150 Zoological Bibliography (1) Methods of locating and using zoological literature, bibliographies, and abstracts, and of preparing bibliographies and scientific papers.

5180 Fresh Water Invertebrate Zoology (4) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Laboratory and field study. Prereq: 3150.

5210 Plant Parasitic Nematodes (4) (Same as Agricultural Biology 5210.)


5270 Advanced Neurophysiology (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. S/NC only.

5360 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. S/NC only.

5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5510-20 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. S/NC only.


5670 Cellular Immunology (4) Laboratory course with emphasis on immunological basis of immunity 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.

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) Oper- ational principles and methods needed to study electrical and kinetic properties of epithelia and electrically excitable tissues. Quantitative handling 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.

5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. Offered spring quarter. 2 hrs and 2 labs.

5860 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.

5970 Insect Systematics (4) Ecology of insect communities.

6000 Doctoral Research and Dissertation

6110 Seminar in Cellular Biology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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.


6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

6510 Seminar in Genetics (2) Prereq: General genetics. May be repeated. Maximum 6 hrs.

6610 Seminar in Ornithology (2) Prereq: 4300. May be repeated. Maximum 6 hrs.

6650 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, 4660-70, Botany 5061, or consent of instructor. May be repeated. Maximum 6 hrs.

6710 Seminar in Ecology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6910 Seminar in Radiation Biology (2) Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
The College of Nursing offers a five-quarter program of study leading to the Master of Science in Nursing degree. The general purpose of the program is to prepare at the graduate level nurses who are qualified to function as practitioners, clinicians, educators, and administrators in all segments of the health care delivery system.

Upon successful completion of the program, graduates will be able to:
1. Provide advanced high quality, comprehensive nursing care to individuals and groups in a variety of settings;
2. Collaborate with other health professionals in systematic implementation and evaluation of health care delivery to large groups in agency and community settings;
3. Utilize appropriate advanced teaching, administrative and clinical practice skills in the discharge of one's professional responsibilities;
4. Utilize appropriate research findings in the implementation and evaluation of nursing care;
5. Participate in clinical research activities by means of data collection, tabulation, and analysis, and by generating research topics for referral to nurse researchers.

GENERAL REQUIREMENTS 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: 14 hrs
   - Clinical concentration option: 26-30 hrs
   - Functional concentration option: 11 hrs
   - Electives: 5-9 hrs
   - Total: 60 hrs
3. A Master's thesis is not required, but those students who wish to complete a thesis as a part of their program may substitute the thesis for the 9 elective hours.
4. Those students who do not choose the thesis option must successfully complete a comprehensive final examination.
5. Students may choose either primary or secondary care as a clinical concentration option. Students selecting the primary care nursing option must complete the following courses: 4770, 5050, 5240, 5260, 5650. Students selecting the secondary care nursing clinical option must complete the following courses: 5120-30 (or 5140-50), 5160, 5310, 5330.
6. The core requirement which must be completed by all students regardless of clinical option includes 5010, 5020, 5210, and a graduate level statistics course which must be approved in advance by the student's faculty advisor.
7. Students may select a functional concentration option in teaching, management or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5630. Students selecting the management option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the advanced clinical practice option must complete 5560 and 5660 if their clinical option is primary care or 5320 and 5340 if their clinical option is secondary care. All courses taken in other colleges must be approved in advance by the student's faculty advisor.

Faculty
Professor:
S. E. Hart (Dean), Ph.D. New York.
Associate Professors:
M. E. Groer, Ph.D. Illinois; K. J. Kant, Ph.D. Illinois; J. Marlan, Ph.D. Purdue; B. M. Reid, M.S.N. Columbia.
Assistant Professors:
K. P. Conlon, M.S.N. SUNY (Buffalo); M. M. Fenske, M.N. Florida; C. Knapper, M.A. Vanderbilt; M. F. Kollar, M.A. Vanderbilt.

Courses
4350 Oncology Nursing (3) In-depth exploration of the cancer problem, medical and nursing intervention. Relates cellular kinetics to theories of carcinogenesis and metastasis, and examines treatment modalities and nursing intervention employed in all phases of the disease. Interdisciplinary approach analyzed. Prereq: Nursing 4230, R.N. status, or consent of instructor.
4770 Comprehensive Health Assessment (6)
Principles and theories underlying health screening of children and adults, including health history, interviewing and physical examination. Prereq: All 3000-level nursing courses or equivalent or consent of instructor. 4 hrs and 2 labs.

5000 Thesis

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

5010 Applied and Pathophysiology (5)
Advanced physiological theories and principles related to normal and abnormal body function with particular emphasis on those processes which, when altered, are most commonly encountered in acute and chronic disease states.

5020 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.

5050 Applied Pharmacology (4)
Advanced pharmacological concepts applied to clinical situations; in-depth exploration of indications, contraindications, common dosages, side effects, interactional effects and expected action of selected pharmaceutical agents.

5103 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.

5110 Geriatrics and Gerontology (4)
Physiological, psychological, developmental, economic, and sociocultural aspects of aging; health needs of aging people; common health problems associated with aging process in management of healthcare for elderly. Prereq: 5010. 2 hrs and 2 labs.

5120 The Acutely Ill Adult I (6)
In-depth exploration of physiological and pathological manifestations encountered in acute illness usually associated with adulthood. Medical and nursing therapeutic modalities will be explored and analysed. Prereq or coreq: 5010. 3 hrs and 3 labs.

5130 The Acutely Ill Adult II (6)
Continuation of 5120 with further exploration and analysis of impact of acute illness on children and their families. Prereq: 5010. 3 hrs and 3 labs.

5140 The Acutely Ill Child I (6)
In-depth exploration of physiological and pathological manifestations of acute and chronic diseases with special emphasis on developmental implications. Medical and nursing therapeutic modalities. Prereq or coreq: 5010. 3 hrs and 3 labs.

5150 The Acutely Ill Child II (6)
Continuation of 5140 with further exploration and analysis of impact of acute illness on children and their families. Prereq: 5140. 3 hrs and 3 labs.

5160 Emergency and Intensive Care Nursing (3)
Nursing approaches needed for effective management of emergency and crisis situations. Nursing knowledge and skills to monitor and care for persons in overwhelming traumatic and/or disease states. Prereq: 5010. 1 hr and 2 labs.

5170 Readings in Applied Physiology (3)
Carefully planned library study of selected topics in physiology and pathophysiology related to various body systems. Prereq: 5100.

5210 Nursing Research Methods (4)
Utilization of research process to identify and solve common nursing problems; data collection and analysis; use of the literature; presentation and publication of findings. Prereq: Graduate level course in behavioral or biomedical statistics.

5240 Management of Common Health Problems (6)
Indications for treatment and referral; use of protocols and treatment plans; pharmacological agents in common use; intervention in emergencies. Prereq: 5010, 4770. 3 hrs and 2 labs.

5250 Chronic Health Problems (4)
Identification and in-depth exploration of health problems of long-term or lifelong nature common to people in various age groups over life continuum; nursing and health care management of individuals and groups who must deal with one or more chronic health problems throughout most or all of their lives. Prereq: 5010, 4770. 2 hrs and 2 labs.

5260 Advanced Family Health Care (4)
Nursing and health care management of families in childbearing and child-rearing stages of development; advanced developmental theory, family dynamics, management of women during pregnancy, labor and delivery, and post partum period, assessment of newborn infants. Prereq: 5010, 4770. 2 hrs and 2 labs.

5310 Secondary Care Nursing Field Work I (9)
Advanced clinical practice in acute care hospital settings with opportunities to apply newly acquired nursing knowledge to more complex clinical nursing situations. Prereq: 5120-30 or 5140-50.

5320 Secondary Care Nursing Field Work II (9)
Continuation of 5310 with emphasis on further acquisition and refinement of nursing skills needed to provide high quality nursing care to acutely ill patients. Prereq: 5310.

5330 Secondary Care Nursing Seminar I (2)
Weekly on-campus seminar taken concurrently with 5310; topics focus on discussion of nursing problems commonly encountered in acute care settings.

5340 Secondary Care Nursing Seminar II (2)
Continuation of 5330 to be taken concurrently with 5320.

5410 Principles of Community Mental Health I (3)
Epidemiology of mental health; sociocultural, religious, and economic variables affecting mental health status of individuals, families, and communities; function and status of community mental health centers.

5420 Principles of Community Mental Health II (3)
Continuation of 5410 with emphasis on recognition and developing approaches to mental health promotion and maintenance.

5430 The Adult and Mental Health (3)
Coping and adjustment problems commonly experienced from post adolescence through middle adulthood; nursing approaches to alleviation of mental health problems of both institutionalized and non-institutionalized adults.

5550 Nurse Practitioner Fieldwork I (9)
Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5550, 5630, 5650.

5560 Nurse Practitioner Fieldwork II (9)
Placement in 5560 with emphasis of obtaining supervision. Nurse practitioner skills coupled with ability to function more autonomously. Prereq: 5550.

5630 Teaching Strategies and Practicum (5)
Analysis and application of curricular and teaching modalities; field placement with supervised opportunities to provide both classroom and clinical instruction to undergraduate nursing students. Prereq: 6 hrs approved education courses or consent of instructor. 2 hrs and 3 labs.

5650 Nurse Practitioner Seminar I (2)
Weekly on-campus seminar taken concurrently with 5550; topics focus on common nursing and health problems identified by nurse practitioner field students and role of nurse practitioner in health care delivery.

5660 Nurse Practitioner Seminar II (2)
Continuation of 5650 taken concurrently with 5560.

5730 Management Strategies and Practicum (5)
Analysis and application of managerial and supervisory theories and strategies; field placement in nursing service facility with supervised practice in nursing service administration. Pre-
Graduate School of Biomedical Sciences

W. E. Barnett, Director
R. J. Preston, Associate Director

MAJOR Biomedical Sciences

DEGREES M.S., Ph.D.

The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, located within the Biology Division of Oak Ridge National Laboratory, offers programs leading to the Master of Science and Doctor of Philosophy degrees. The National Laboratory, one of three installations operated at Oak Ridge by Union Carbide Corporation for the Department of Energy, is a well-known center of basic research. The school utilizes the staff and facilities of this laboratory, and thus brings directly into the mainstream of full-time graduate study in the life sciences the talent and experience of that staff, as well as the most advanced research methods and technology.

The program of study, which incorporates a high faculty-to-student ratio, is based on intensive graduate courses supplemented by tutorial instruction, participation in a wide variety of seminars, and a heavy emphasis on communication skills, research training and independent study. The program encourages students to pursue graduate studies to the limits of their abilities.

The School is not departmentalized, and, apart from certain basic requirements, each student's curriculum is planned to meet individual needs, with the aim of giving: (1) strength in the basic sciences; (2) perception of the biomedical sciences as a whole; and (3) experience and training in a chosen specialty.

The research areas available for Master's thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, and cellular, developmental and mammalian biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutation, and problems of aging.

ADMISSION REQUIREMENTS

A Bachelor's degree or its equivalent is required. Students with M.D., D.V.M., or M.D. degrees are also encouraged to apply. Completed applications, Graduate Record Examination scores and letters of reference should be sent to the address below. The student will need previous training in biology, calculus, physics, and organic and physical chemistry. However, a course in physical chemistry is offered by the School in order to meet this requirement. It is recommended that deficiencies in meeting entrance requirements should be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to: Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM

Requirements for the Ph.D. degree are:
1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology (5180-90); Mammalian Physiology (5200); and Statistics for Biologists (5740).
2. Three quarters of Biomedical Sciences Laboratory (5310-20-30-40).
3. Participation in Biomedical Sciences Seminar (5350-60-70) for one year.
4. Participation in at least one of the seminar courses (6110-70) during each quarter of residence after the first year is strongly recommended.
5. Satisfactory completion of formal advanced courses in the area of the student's interests. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.
6. Pass both written and oral examinations.
7. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course 6000 is required.
8. A final oral examination on the dissertation.
9. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and as space is available.

Requirements for the M.S. degree are:
1. Graduate credit or a proficiency in the following core courses: Biochemistry (5110-20); Cell Biology I (5180); Cell Biology II (5190); plus any three of the following four courses: Biophysics (5140); Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.
2. Forty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of credit for course 5000).
3. For admission to candidacy: Completion of any required prerequisite courses and one quarter of graduate course work with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.
4. A Master's Committee of three approved faculty members upon admission to candidacy.
5. A thesis reporting results of original and significant scientific research.
Full-Time Faculty


Associate Professors: F. H. Gaertner, Ph.D. Purdue; F. D. Hamilton, Ph.D. Pittsburgh.

Assistant Professor: N. W. Reifs, Ph.D. Glasgow (Scotland).

Research Assistant Professor: C. T. Madden, Ph.D. Washington.

Shared Faculty

Not all faculty listed are necessarily available for research roles in every academic year.

Courses

The courses below are not necessarily taught every year.

5000 Thesis

5070-80 Physical Chemistry for the Life Sciences (3, 3) Thermodynamics, phase equilibria; chemical equilibrium; reaction rates; surface chemistry; electrolyte solutions, kinetics, conductance, viscosity, diffusion.

5110-20 Biochemistry (3, 3) Chemistry of carbohydrates, lipids, proteins, nucleic acids, and coenzymes; enzyme kinetics; intermediary metabolism; chemical synthesis; biosynthesis of amino acids, pyrimidines, lipids, and macromolecules. Coreq: 5700-80.

5140 Biophysics (3) Energy levels and excited states of large molecules; optical instrumentation; adaptations to system perturbations; properties of macromolecules in solutions; molecular conformations; inter- and intramolecular forces; physical principles of microscopy. Prereq: 5070-80.

5150 General Genetics (2) Mendelian genetics, mitosis, and meiosis. Transmission genetics, mapping, and linkage.

5160 Advanced Genetics (3) Genetics of phage, bacteria, animals, and plants. Mapping, linkage, mutation, genetic meta-analysis; suppression of silencing and nonsense mutations; mechanistic complementation, recombination. Prereq: 5150 or equivalent.

5170 Molecular Genetics (3) Molecular biology of genetic processes; gene regulation; coding; protein synthesis; suppression of missense and nonsense mutations; mechanistic complementation, recombination. Prereq: 5170.

5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of euukaryotic cells. Particulate ingredients and techniques; metabolism and function of mitochondria, chloroplasts, peroxisomes and other organelles as related to metabolism and regulation; transport phenomena; cellular osmosis. Prereq: 5110, 5180. Coreq: 5120.

5190 Cell Biology II (3) Comparative biochemical approach to cell structure and function. Membrane systems and metabolism; development and function of mitochondria, chloroplasts, peroxisomes and other organelles as related to metabolism and regulation; transport phenomena; cellular osmosis. Prereq: 5110, 5180. Coreq: 5120.

5200 Developmental Biology (3) Principles of development; intermediate stages of development; structures of various organ systems; organ growth and development; morphogenesis; development of mammalian systems; development of amphibian embryos; development of avian embryos. Prereq: 5110. Coreq: 5120.

5230 Biochemical Concepts in Medical Sciences (3) Biological mechanism involved in physiological conditions and pathological processes of human body. Dynamic functions of organ systems; biochemical pharmacology; hormone actions; neurochemistry. Current biochemical advances in basic and clinical medicine. Prereq: 5200. 5110-20.

5310-20-30-40 Biomedical Sciences Laboratory (3, 3, 3, 3) To acquaint students with both approaches and techniques in various areas of modern biology. Students spend a quarter in each of three or four laboratories conducting research in different areas of biomedical science. Required of all first-year students.

5350-60 Biomedical Sciences Seminar (1, 1) Critical analyses of current journal publications in selected area of modern biology. Written evaluation of papers and written presentations by each student. Required of all first-year students.

5370 Biomedical Sciences Seminar (1) Basic principles of scientific writing. Research articles, grant and thesis proposals, abstracts, review articles, progress reports. Required of all first-year students.

5430-90 Graduate Research Participation (3, 6) Special advanced research project covering area not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

5510-20-30 Special Topics in Biomedical Sciences (1, 3, 3) Tutorials or formal lectures. Potential topics include x-ray crystallography; exocellular enzyme mechanism of macromolecules; computer science; pathology; cytology and cyogenetics; 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 variables; normal, binomial, 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 bond, nucleophilic and electrophilic reactions, molecular rearrangements, oxidative and reductive synthesis; organic and nucleic acid modification reagents, reactions involving proteins and nucleic acids on polymer supports.

5860 Cryobiology (3) Physical and chemical properties of cells and biomolecules to low temperatures and ice formation. Relation of these responses to permeability, structure of semipermeable membranes, conformation of macromolecules, and nature and state of water in cells; and how they bear on other fields of biology and medicine— including electron microscopy, photobiology, cell physiology, exobiology, ecology, cryosurgery. Prereq: 5070-80, or equivalent.

5920 Mammalian Genetics (3) Orderly presentation of known genetic variants affecting each organ system of experimental mammals, especially laboratory mammals. Prereq: 5170. Coreq: 5120.

5940 Classic Experiments in Genetics (3) Original papers presenting new and lasting concepts in genetics. Prereq: 5170.

6000 Doctoral Research and Dissertation

6110 Seminar in Plant Physiology (1) May be repeated. Maximum 12 hrs. S/NC only.

6120 Seminar in Cellular and Developmental Biology (1) May be repeated. Maximum 12 hrs. S/NC only.

6130 Seminar in Genetics (1) May be repeated. Maximum 12 hrs. S/NC only.

6140 Seminar in Mammalian Research (1) May be repeated. Maximum 12 hrs. S/NC only.

6150 Seminar in Immunology (1) May be repeated. Maximum 12 hrs. S/NC only.

6160 Seminar in Biophysics (1) May be repeated. Maximum 12 hrs. S/NC only.

6170 Seminar in Biochemistry (2) May be repeated. Maximum 24 hrs. S/NC only.

6180 Advanced Seminar in Biomedical Sciences (1-3) Presentation, evaluation and discussion of current research in various areas of biomedical sciences, including cell biology, genetics, biophysics, and biochemistry. Prereq: Consent of instructor. May be repeated. S/NC only.
6190 Seminar in Animal Virology (1) Discussion of experimental data and in-depth surveys of active research problems in virology through use of literature. Prereq: Microbiology 4521 or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/N/C only.


6210 Protein Chemistry and Enzyme Mechanisms (3) Theoretical and practical aspects of protein chemistry including chemical and physical characterization of proteins, chemical modification of proteins, and structure-function relationships. Latter emphasizes enzymes, includes approximation of substrates, catalysis, general acid-base catalysis, and strain and distortion of substrates. Prereq: 5110-20.


6240 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes, enzymic expression, and nervous tissue. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Prereq: 5110-20.

6270 Viral Carcinogenesis (3) History of viral oncology and descriptive catalog of tumor viruses. Biology of normal and transformed cells. DNA tumor viruses; replication cycle; transformation; genetics; natural history. RNA tumor viruses; endogenous and exogenous states; genetics; induction; transformation; natural history.


6290 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymology, metabolism; membranes; DNA repair; regulation; strategies in chemotherapy.

6300 Mutagenesis (3) Basic mechanisms in chemical and radiation mutagenesis and dosimetry in variety of systems including bacteria, fungi, Drosophila, and mice.

6510-30-40 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.
Graduate School of Library and Information Science

Ann E. Prentice, Director

MAJOR
Library Science

DEGREE
M.S.L.S.

The Graduate School of Library and Information Science provides a library education program leading to the preparation of librarians for work in all types of libraries. The programs of study of this School include the graduate curriculum leading to the degree of Master of Science in Library Science.

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 center;
4. Enable students to assume individual and collective responsibility for the well-being and development of their profession and of professional service;
5. Enable students to make informed assessments and decisions regarding various career opportunities in libraries and information centers.

PROGRAMS OF INSTRUCTION

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 21 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis program is available, with 9 hours allowed for thesis credit. At least 36 hours must be taken in the Graduate School of Library and Information Science, allowing up to 15 hours outside the School. Upon completion of the program, all students are subject to an examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination. Programs are designed for persons interested in school libraries, public libraries, academic libraries, special libraries and information centers as well as a variety of library and information related activities.

ADMISSION REQUIREMENTS

The minimum grade point average for admission to the Graduate School is 2.5. Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the aptitude test of the Graduate Record Examination. The test should be taken at least one quarter in advance of application for admission to the Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language.

APPLICATION PROCEDURE

Admission to the programs in the Graduate School of Library and Information Science should be made in advance of the quarter for which admission is requested. Applicants should submit the "Application for Admission" form (printed as the first page of the Graduate School Catalog) and should request the registrars of all colleges and universities attended to send two official transcripts to the Graduate School. In addition, each applicant should make arrangements to take the GRE and TOEFL exams, if applicable. A personal data sheet and three recommendations (obtained from the Graduate School of Library and Information Science) should be returned to the Director of the School.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus extend the period required for the degree up to two years.

Similar opportunities exist with some other libraries in the Knoxville area.

A limited number of graduate assistantships are available through the School for the degree. Assistantships of this type carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in the School.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

Faculty

Professors:
G. E. Mauldin, M.S.L.S., Illinois; G. R. Purcell, Ph.D., Case Western Reserve.

Associate Professors:

Assistant Professors:
J. Knightly, Ph.D., Texas; J. M. Pemberton, Ph.D., Tennessee; G. M. Sinkankas, Ph.D., Pittsburgh.

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; relationship to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.)

4270 Organization of Library Collections (6) Acquisitions, cataloging and maintenance of library collections.
4330 Introduction to Reference Materials (3)
Basic information sources and services for all libraries.

4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Vocational-Technical Education 4750)

5000 Thesis

5002 Non-Thesis Graduation Completion (3-19)
Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

5110-20-30 Problems in Library Science (3, 3, 3) May be repeated with consent of the school.

5140 Research Methods in Library Science (3)
Research methods applicable to librarianship. Process and conduct of research; analysis of published research.

5200 Subject Reference and Bibliography (3)
General patterns of bibliographic organization and basic information sources in subject fields including non-English materials; experiences in bibliographic methods and search techniques. Prereq: 4330.

5210 Sources and Services for the Social Sciences (3) English and non-English literature and bibliographical sources in mathematics, physics, astronomy, chemistry, geology, biology and medicine; organization of collections for optimum use. Prereq: 5200.

5220 Sources and Services for the Natural Sciences (3) English and non-English literature and bibliographical sources in literature and language, fine arts, music, philosophy and religion; organization of collections for optimum use. Prereq: 5200.

5230 Sources and Services for the Humanities (3) English and non-English literature and bibliographical sources in literature and language, fine arts, music, philosophy and religion; organization of collections for optimum use. Prereq: 5200.

5240 Organization of Library Collections II (3) Construction and maintenance of library catalog as retrieval instrument; indexing and subject analysis theory, comparative classification with emphasis on organization of Congress system, and problems in reclassification. Prereq: 4270.


5260 Government Publications II (3) Acquisition, organization, and utilization of publications of foreign governments and international organizations such as United Nations, UNESCO, and others.

5270 Legal Bibliography (3) Introduction to literature of Anglo-American jurisprudence. Use of reports, statutes, administrative regulations and decisions, treaties, periodicals, and indexes as bibliographic tools.

5300 Library Management (3) Management and organization concepts applicable to libraries and librarians.

5310 Library Systems and Services (3) National, state, and regional information systems. Design and analysis of existing systems within academic or special library sphere.

5320 Library and Information Networks (3) National and regional information systems. Design and analysis of existing systems within academic or special library sphere.

5330 Academic Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group.

5350 School Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group.

5360 Technical Libraries and Information Centers (3) Purpose, functions and organizational characteristics of those libraries and information centers, private and public, which offer scientific and technical information services. Problems related to acquisition, organization, and servicing of technical information collections.

5370 The Library in the Community (3) Public library as social agency; role in education and communication services of community.

5380 Seminar: Academic, Public, School or Special Libraries (3) Prereq: Consent of instructor.

5400 Library Facilities (3) Problems inherent in planning and construction of library quarters. Interrelationship of staff, materials, and user space requirements.


5510 Multimedia Resources of Libraries (3) Selection, acquisition, processing, storing, and servicing nonbook materials, with special attention to films, recordings, microforms, photo-copying.

5520 History of Books and Printing (3) Development of alphabet and writing; early writing materials; book in manuscript; history and technique of printing; book illustration and binding; standards of modern fine printing.

5530 Contemporary Publishing (3) Creation, production, marketing, and distribution of materials acquired by libraries, with special attention to various types of publishers.

5540 Special Collections—Archives and Rare Books (3) Problems involved in acquisition, organization, housing, preservation and utilization of rare books and archival materials.

5600 Reading Guidance for Children and Young People (3) Organization to meet needs, interest, 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 of storytelling; techniques of adaptation and presentation for various age groups; instruction and practice in oral techniques.

5639 Critical History of Children's Literature I (3) Development of literature for children noting influence of changing social and cultural factors; attention to emerging 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 emerging genres through primary sources. 1920 to present.

5691 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 5691.)

5700 Automation of Library Processes (3) Analysis of application of data processing methods to basic library operations such as bibliographic control, technical processes, circulation control, and management functions.

5710 Introduction to Information Science (3) Content and method of information science; application of research findings to general library practice.

5720 Information Systems Analysis and Design (3) Elements in design and operation of information retrieval systems, including acquisition, indexing vocabularies, information representa-
The Graduate School of Planning offers a two-year graduate course leading to a degree of Master of Science in Planning with concentrations in land use, transportation, environmental, regional, administrative, health, and historic preservation planning.

The purpose of study is the education of professional planners, competent to handle positions of increasing technical and administrative responsibility. Graduates are candidates for professional service in regional, city, county, and metropolitan area planning agencies; in local, state, and federal agencies concerned with physical, economic and administrative planning; in private businesses and organizations dealing with urban problems; and in private consulting practices.

The curriculum is organized on a basis of six quarters, or 72 credit hours, and provides the student with core courses in planning theory, methods, and techniques, and also takes advantage of offerings at The University of Tennessee in related fields such as government, economics, geography, civil engineering, and sociology.

The course of study ordinarily requires two years with an optional work internship during the summer between the two years. Planning courses as well as related courses will be offered during the summer 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 Director of the 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 and quantitative) portion of that test. All applicants are also requested to submit a statement of career goals.

All inquiries concerning admission should be addressed to J. A. Spencer, Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37916.

**DEGREE REQUIREMENTS**

Each student will be required to complete a minimum of 72 hours credit.

The following courses are the required core curriculum for the M.S.P. degree:

- 5040, 5045, 5100, 5110, 5130, 5180, 5230, 5270, 5280, 5340, 5435, 5440, 5465, 5500, Sociology 5320 or Statistics 5211. Waivers can be made by the faculty where competence is demonstrated.

Each student will be required to demonstrate competence in individual research. This may take either of two forms.

- **Plan I**—Complete a thesis for 9 hours credit.
- **Plan II**—Complete a major study with acceptable documentation, in order to be eligible for the major study the student must have earned a grade of B+ or higher in Research Methods II, have a 3.5 cumulative grade point at the time of approval of the major study proposal, and have completed at least 24 hours of graduate study. The student meeting these criteria may present a proposal for a major study which will include at least 9 hours of elective course work in an area of concentration. The proposal shall justify the area of study, the approach to the study, 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:
K. B. Kenney, Ph.D. North Carolina;
J. M. Prochaska, M.U.P., Michigan State;

Associate Professors:
G. E. Bowen, M.A. George Washington;
J. H. Spencer, M.C.P., Ohio State; A. L. Wilson,
M. R. North Carolina.

Assistant Professors:
E. Cole, M.S.P. Tennessee; P. Fisher, M.S.
Florida State; L. A. George; G. Spaldes, M.S.L.S. Case Western Reserve;
G. M. Siler, M.S.P. Tennessee; J. G. Stoloff,
M.U.P. Hunter.

Courses

4100 Survey of Planning (3) History of city development and of planning with special attention to the U.S. experience in urban and other levels of planning. State of the art, the process, the comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree.

5000 Thesis

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

5005 The Planning Process (3) Identification and examination of generic aspects of planning processes and techniques employed in a variety of settings. Not for credit for M.S.P. degree.

5040 Communications for Planners I (1) Introduction to basic communications, interpersonal and oral communications, graphic presentations, audiovisual equipment.

5045 Communications for Planners II (1) Graphic communications in planning. Maps and mapping, computer graphics, models and presentation graphics. Prereq: 5040.

5050 Communication for Planners III (1) Audiovisual equipment, programmed communications, and photography used in planning. Prereq: 5045.

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.

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.

5130 Planning Research Methods I (2) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making. (Same as Water Resources Development 5130.)

5135 Planning Research Methods II (3) Application of rigorous 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.

5145 Library Research for Planning (1) Survey of publications of interest to planners, including reference and research techniques. Use of facilities and collections of UTK library.

5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Water Resources Development 5160.)

5170 Planning for Historic Preservation (3) Planning for preservation, restoration and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local governmental role in preservation, designation of sites, legislative needs, financing and administrative organizations.

5180 Planning Analysis and Forecasting (3) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, economic and social trends with emphasis on forecasting techniques. Prereq: 5130.

5230 Urban and Site Design (3) Principles of design of residential subdivisions and some components of physical community such as shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience.

5235 Urban and Site Design II (3-6) Prereq: 5230.

5270 Planning and Transportation (3) (Same as Civil Engineering 5270.)

5280 Planning Methods (5) Tooling up studies; methods for preparation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5180.

5300 Regional Planning (3) Making planning process operative in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by states, single-purpose agency planning, and TVA. Prereq: 5100.

5310 State Planning (3) Evolution of planning function in state government, with emphasis on institutional environment in which planning occurs. Context and scope of state planning, and relationships with other branches and levels of government. Prereq: 5100.

5340 Implementation (3) Policy formulation, information systems, taxation, capital improvement programming, and other aspects of plan implementation. Programming public actions to affect development. Prereq: 5440.

5360 New Towns (2) Historical development of planned new towns and implications for national urbanization policy in United States; process by which new towns are created, from establishment of objectives to administration of development process and provision of public services; organizational alternatives for new town planning, development and management in context of past experience and future objectives. Prereq: 5110 and consent of instructor.

5380 Housing (3) Nature and demand for housing in U.S. and abroad with emphasis on U.S. experience. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing. Coreq: 5110 or consent of instructor.

5390 Futures (3) Alternative futures and their implications for future living patterns and community planning. Techniques of futures research.

5410-20-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. May be repeated. Prereq: Consent of instructor.

5435 Planning and Government (3) Governmental context within which planning occurs. Policy making as public process. Planning structures, powers, and policies.


5455 Urban Revitalization (3) Goals, principles and strategies for restoring and revitalizing cities. Review and analysis of historic, current, and proposed public and private programs aimed at urban revitalization. Physical building and restoration activities as related to financial and administrative requirements. Relationship between construction oriented activities and economic and social development programs is emphasized. Prereq: 5110 or consent of instructor.

5460 Planning Administration (2) Planning agency management, program development, and agency finance. Prereq: 5435.

5465 Planning and Property Development (3) Process of urban physical growth and change with emphasis on functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 5440.

5560 Synthesis (3) Problem-oriented experience to integrate knowledge from previous courses. Interrelationships studied; student required to use judgment in evaluation and creation of plans and policies addressed to real world situations. Extensive laboratory experience. Prereq: Required planning courses or consent of faculty.

5670 Social Planning (3) Theory, philosophy and implications of programs for planned social change. Consideration of major social planning issues in diverse fields of service; aging, corrections, education, health, manpower, mental health, social services. Prereq: Consent of Instructor. (Same as Social Work 5567.)
The School of Social Work recognizes and enjoys the challenge of cultural pluralism in society and encourages applications for admission from minority group members. Through the planned inclusion of significant and pertinent racial and ethnic content in the curriculum, the School provides students with the educational background needed to take creative roles in the social work profession’s efforts toward the elimination of racism and such other social ills as poverty, crime, neglect, and social injustice.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, 2014 Lake Avenue, Knoxville, Tennessee 37916.

AREAS OF PROFESSIONAL PRACTICE

Specializations within the School’s curriculum prepare students for social work careers in such practice fields as criminal and juvenile justice systems; family and child welfare services in public and voluntary agencies; group services in neighborhood and community centers; health services; mental retardation; public welfare services; mental health services; manpower training programs; governmental and voluntary human services planning agencies; rehabilitation services; school social work; and social gerontology.

THE PROFESSIONAL CURRICULUM

The School of Social Work’s curriculum is designed to provide the student with the basic components of professional competence through a progression of course work and supervised practice experience. Students may elect a thesis or non-thesis option. The two-year, six-quarter program includes a core curriculum, a specialization in one of two areas—social work treatment or social welfare administration and planning—and concurrent field practice.

The Core Curriculum

The core curriculum is offered during the first two quarters of the first year and is required of all students. It is a 30-quarter-hour sequence of five basic courses. As the initial phase of the School’s educational program, the core curriculum contributes to the process of socialization and professional identification, and presents students with a comprehensive and broad knowledge base from which to operate in the future as practitioners and administrators.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Quarter, First Year</td>
<td>5910 Social Work Practice I, 5920 Field Practice</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>5930 Field Practice, 5410 Social Work Practice I</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>5940 Field Practice, 5420 Social Work Practice II</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>5950 Field Practice (Elective)</td>
<td>2 or 3</td>
</tr>
<tr>
<td></td>
<td>TOTAL QUARTER HOURS</td>
<td>31 or 32</td>
</tr>
<tr>
<td>Winter Quarter, First Year</td>
<td>5960 Field Practice (Elective)</td>
<td>2 or 3</td>
</tr>
<tr>
<td></td>
<td>5110 Social Welfare Policy and Services I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5120 Social Welfare Policy and Services II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5220 Human Behavior and Social Environment I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5410 Social Work Practice I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5910 Field Practice</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>TOTAL QUARTER HOURS</td>
<td>16</td>
</tr>
<tr>
<td>Spring Quarter, First Year</td>
<td>5930 Field Practice</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Specialization Courses and Electives</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>TOTAL QUARTER HOURS</td>
<td>14</td>
</tr>
<tr>
<td>Fall Quarter, Second Year</td>
<td>5940 Field Practice (Elective)</td>
<td>2 or 3</td>
</tr>
<tr>
<td></td>
<td>5110 Social Welfare Policy and Services I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5120 Social Welfare Policy and Services II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5220 Human Behavior and Social Environment II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5910 Field Practice</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>TOTAL QUARTER HOURS</td>
<td>16</td>
</tr>
<tr>
<td>Winter Quarter, Second Year</td>
<td>5940 Field Practice (Elective)</td>
<td>2 or 3</td>
</tr>
<tr>
<td></td>
<td>Specialization Courses and Electives</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>TOTAL QUARTER HOURS</td>
<td>14</td>
</tr>
<tr>
<td>Spring Quarter, Second Year</td>
<td>5930 Field Practice</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5961 Integrative Seminar</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>One Elective</td>
<td>2 or 3</td>
</tr>
<tr>
<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 basic to the individual, family, and group methods applicable in the treatment of diverse client problems.

Social Welfare Administration and Planning
Social welfare administration and planning deals with the design, implementation, and continued operation of effective programs for client service. Specifically, the methods deal with assessment of client characteristics, development of environmental resources, design of effective organizational structures, staff development, program evaluation, social planning, neighborhood and community development, financing, and coordination of services.

Field Practice
Field practice is a critical component of the student's first- and second-year program. Because the School of Social Work cooperates with a wide range of social agencies and human service programs in the principal cities in Tennessee and areas immediately adjacent to the State, the School is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agency and the field instructor to assure that the student has a quality field practice experience which meets the objectives of the core curriculum and the specialization.

The first-year curriculum is on a concurrent class and field plan, with students engaged in classroom study two or three days per week and in field practice the remainder of the week. First-year agency placements are selected to provide the student with practice experiences related to the core curriculum content and beginning specialization. Within the placement, each student's experiences are planned and designed according to the educational needs.

In the second year, students are engaged full time in classroom courses during the fall quarter. The winter and spring quarter plan consists of a block field placement of four days per week and at least one concurrent classroom course each quarter. Second-year placements are selected according to the student's area of specialization, individual career interests, and educational needs. The student actively participates with the field practice coordinator and the specialization committee in selection of the second-year placement. The second-year field practice experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of full practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

DEGREE REQUIREMENTS
1. Satisfactory completion of the curriculum.
2. All courses taken as part of the degree programs, whether taken within the School of Social Work or outside, must be acceptable for graduate credit, relevant to social work and to the student's career objectives, and have the approval of the student's faculty advisor.
3. Achievement of a B average on all work presented for the Master's degree.
4. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
5. Students who elect a non-thesis option must pass a written comprehensive examination.
6. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.

The minimum number of credit hours required for the degree shall be 79 hours, including a maximum of 36 S/NC hours.

ADMISSION REQUIREMENTS
Admission to the professional curriculum is based on the following requirements:
1. A Bachelor's degree from an accredited college or university with some preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in the social sciences, humanities, physical sciences, and other liberal arts subjects. Those with other academic backgrounds may request consultation regarding ways in which they might be admitted.
2. A grade point average of 2.5 on a 4.0 scale, with those scoring 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. Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed no later than March 1 for the year in which admission is desired.

ACCELERATED PROGRAM
The University of Tennessee School of Social Work has a special accelerated program which enables eligible candidates to complete the M.S.S.W. degree in four quarters. This Accelerated Program is approved by the Council on Social Work Education.

Students who qualify for the Accelerated Program must:
1. Have maintained a 3.0 or above grade point average (on a 4.0 scale) in undergraduate work.
2. Have an undergraduate major in social work which included a supervised field practice component, or have two years full-time practice in the field of social work.
3. Pass a qualifying examination administered by the School of Social Work faculty in early spring.

The accelerated program begins in June in the Nashville Branch only with an intensive ten-week term from which students proceed in the fall into the regular second-year curriculum. Application for admission to the accelerated program must be made through the regular admissions process. Applications should be filed no later than January 31 for the year in which admission is desired.

PART-TIME STUDENTS
Courses in the regular curriculum of the School are open to persons who meet the admission requirements for full-time study and who are planning to complete the work for the degree within the next two or three years. Application should be made to the School in the regular way, but the applicant should inform the Director of Admissions of the wish to begin part-time study on a planned basis.

TRANSFER CREDITS
Courses completed in another accredited school of social work are usually accepted for The University of Tennessee School of Social Work degree requirement providing the applicants meet the admission requirements of the Graduate School and The University of Tennessee School of Social Work, and if previous courses are equivalent to required or elective courses offered here. The University of Tennessee School of Social Work allows a maximum of 45 credit hours of graduate course work taken at another accredited institution to be transferred into the student's Master's program. Such work must have been taken for graduate resident credit and passed with a B or better. In addition, it must be part of an otherwise satisfactory graduate program (B average) and be approved by the branch director and the dean. This coursework must be completed within the six-year period prior to the receipt of the degree. In addition, S/NC credit earned for the field practicum is also accepted.

Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the School of Social Work and the student's major professor.

Faculty

Professors:
M. H. Bloch, M.S.S.W.; R. C. Bonovich, D.S.W.;
G. W. Fryer, Ed.D.; B. P. Granger, Ph.D.;
B. E. Orchard, M.S.S.A.

Associate Professors:
L. Beasley, D.S.W.; B. J. Cleckley, Ph.D.;
C. T. Cruthirds, Jr.; D.S.W.; J. C. Eades, Jr.,
D. P. Fauri, Ph.D.; P. F. Kramer, Ph.D.;
K. MuUins, Ph.D.; D. M. Noe, M.S.W.

Instructors:
J. D. Oten, M.S.S.W.; S. B. Rowen, Ph.D.
H. Rubenstein, Ph.D.; D. A. Sullivan, M.S.S.W.
H. J. Vaught, M.S.S.W.; B. C. Wichter,
M.S.S.W.; G. B. Zarbock, M.S.S.W.

Assistant Professors:
J. Bates, M.S.W.; J. W. Charring, M.S.S.W.;
S. W. Cole, M.S.S.W.; B. J. Collier, M.S.S.W.
M. Feit, Ph.D.; A. R. Ford, M.S.W.; V. A. Gates,
M.S.S.W.; R. G. Haas, M.S.W.
J. M. Hamrick, M.S.S.W.; T. M. Harrison,
M.S.S.W.; H. Halker, M.S.S.W.;
W. D. Harrison, A.C.S.W.; H. Hirohama, D.S.W.;
within context of functions, structures, roles and processes. Behavior of these systems conceptually is influenced by functional and normal-deviant continuum. Organizing themes, development and maturation, adaptation and defense, and intensive techniques of the system approach used to understand interrelationship of biological, psychological, and social variables with emphasis on culture and ethnicity.

5290 Special Accelerated Program in Social Work (15) Ten-week program providing qualified students with intensive academic and field practice experience that qualifies them to enter second year of graduate study upon successful completion of this program. S/NC only.

5310 Human Behavior and Social Environment (2-3) Describes and expands student's knowledge of range of adaptive behavior; continuum of behavior 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 prose, drama, and poetry, which illuminate and expand knowledge and appreciation of every person's humanity. Adapting social work principles to ordinary and extraordinary life situations and events, portrayed by creative writers. Artistic representation of human condition and social work through 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 of and recent research in etiology of psychic dysfunction and social variance. Categorical approaches, summarized 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 of children and youth, etiology, symptomatology, and range of social services and treatment modalities. Prereq: Completion of core or consent of instructor.

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.

5315 Human Sexual Problems (2-3) Desensitization and desensitization of personal and social attitudes toward sexual behavior, clinical problems and experiences of the human worker and role 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 values, attitudes toward work, patterns of employment, effect of changing technologies on individual and community, development of knowledge and skill in use of group methods in social work practice; organizational and range of social services and treatment modalities. Prereq: Completion of core or consent of instructor.

5317 Social Policy Analysis (2-3) "Policy science" techniques are considered for appropriateness in assessing social, political, and economic implications of social policy proposals. Prereq: Completion of core or consent of instructor.

5318 Social Policy Seminar (2-3) Examination of theories of complex organizations applied to social work service delivery settings. Transformation of collective social welfare resources into divisible and indivisible social welfare benefits through organized instrumental action of professional nature.

5319 Social Planning (3) (Same as Planning 5670.)

5321 Professional Practice Seminar (2-3) Application of practice theory to assist in planning, methodology and skills development of student. Prereq: Completion of core or consent of instructor.

5322 Social Policy Seminar (2-3) Examination of theories of complex organizations applied to social work service delivery settings. Transformation of collective social welfare resources into divisible and indivisible social welfare benefits through organized instrumental action of professional nature.
of administrative principles that make possible effective provision of welfare services.  

5702 Organizational Design of Social Welfare Agencies (2-3) Critical problems of adapting organizational structure and operational patterns to new tasks, objectives, and mandates. Planning and design techniques for new programs and for modification of existing programs for appropriate deployment of resources and personnel for maximum effectiveness and efficiency. Integration of theory and experience for development of practical skills for coping with various situations. Prereq: Second-year administration or community organization students; consent of instructor; 5761 or equivalent.  

5741 Supervision in Social Work (2-3) Dual roles of supervisor in various settings, and supervision distinguished from consultation and from direct practice. Responsibility and accountability to client system, supervisee, and executive, problems of middle management position of supervisor. Differences and similarities in supervision of varying levels of personnel, 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 is distinguished from supervision, administration, and direct practice. Types of consultation in relation to various settings and levels of responsibility. Processes and practices of consultation and dilemmas and pitfalls of consultant's position. Prereq: Second-year status or consent of instructor.  

5743 Management of Human Resources in Social Welfare (2-3) Personnel function in administration of welfare programs and agencies. Personnel recruitment, selection, appointment, and supervision; staff development, training, and evaluation. Salary and benefit systems; employer-employee relations; and fair employment practices. Prereq: Completion of core or consent of instructor.  

5744 Education and Training in Social Welfare (2-3) Philosophies and practices of teaching and learning related to adults in social work and social welfare. Distinctions between teaching and learning; training and education; unique aspects of adult learning; measurement issues; models and styles of education. Prereq: Completion of core or consent of instructor.  

5745 Professional Leadership in Social Work (2-3) Leadership in social welfare. Theories of leadership; complexity of leadership; 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.  

5762 Seminar in Social Welfare Administration and Planning (3) To assist students in acquiring specific administrative and planning techniques appropriate for social welfare delivery systems. Prereq: Completion of core or consent of instructor.  

5771 Information Systems and Decision Making (2-3) Decision making in human services organizations, utilization of information in policy formulation, delivery of services, and evaluation of organizational performance. Information generation, collection, processing, storage, retrieval, and utilization in monitoring and management of clients, evaluation and forecasting. Prereq: Completion of core or consent of instructor.  

5772 Financial Management for Social Welfare Administration (2-3) Centralized decision making related to allocation of scarce resources in social 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.  

5780 Management of Residential Settings (2-3) Issues and trends in management and programming in residential institutions for children, aged, mentally ill, mentally retarded, juvenile and adult offenders, and other groups. Prereq: Completion of core or consent of instructor.  

5812 Organizational Perspectives in Juvenile Justice (2-3) Aspects of juvenile justice system: overview of juvenile delinquency; introduction to theories of causation, role of police in detecting delinquency and apprehension of delinquent offenders, police procedures, role of juvenile court, alternatives to institutions, correctional institutions, aftercare programs, and preventive strategies. Prereq: Second-year standing.  

5820 Social Aspects of Illness (2-3) Social, economic, and emotional problems arising from or related to illness and disability as they affect individual, family, and community. Services needed to obtain optimum results from medical care. Lectures, discussions, illustrative case material.  

5825 Drugs: Use and Abuse (2-3) Survey and analysis of social, cultural, medical, and psychological factors underlying alcoholism and drug abuse, recent research and treatment innovations, social work with user and family. Prereq: Completion of core or consent of instructor.  

5826 Social Work Treatment for Marital Adjustment (2-3) Theories regarding social and cultural values and personality processes which gain expression in marriage, concepts regarding contemporary marriage styles, problem areas in marriages, and appropriate treatment approaches. Prereq: Completion of core or consent of instructor.  

5830 Law and Social Work (2-3) Principles of law which relate to social work practice; organization of courts; legal aid societies; and other problems of legal nature that affect social work.  

5860 Social Gerontology (2-3) Physical, psychological, and social aspects of aging: economic and health status of aging; older person and family; community programs for aging; retirement—phenomenon of modern society.  

5865 The Roles of Women (2-3) Roles and statuses of women; emphasis on contemporary American scene. Empirical research as well as popular literature. Ascribed and achieved facets of women's statuses.  

5910-20 Field Practice (3, 4) Instruction and supervised practice in methods of social work with individuals, groups and communities. Prereq: Admission to the School; 5410 concurrently or prior to 5910. 5420 concurrently or prior to 5920. Must be taken in sequence. Required course. S/NC only.  

5920-40-50 Field Practice (4, 8, 8) Specialized instruction and supervised practice in methods of social work practice, administration, and planning in community health and welfare programs and agencies. Prereq: Admission to the School. Must be taken in sequence. S/NC only.  

5961 Integrative Seminar (2) Required seminar facilitates integration of two-year M.S.S.W. program; attention given to current issues in profession and to pressing social problems. Student participation in symposia, discussions, simulations, and gaming situations prepares graduating student to assume positions of responsibility and leadership within profession. Graduate student helped to plan toward continuing his/her education and professional development. S/NC only.  

5970 Outcomes in Social Work Practice (2-3) 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.
Index

Academic Calendar, 2
Academic Termination, 17
Accounting, 38
Activity Fee, 13
Adding Courses, 18
Administration, Graduate School, 6
Administration, University, 7
Admission, Examinations, 13
Admission, International Students, 12
Admission Requirements, 8, 9
Admission to Candidacy, 20, 21
Admission Types of, 8, 9, 12
Admission, Veterinary Medicine Students, 12
Adult Education, 52
Advertising, 47
Advisors, 18
Aerospace Engineering, 82, 84
Agriculture Campus, 4
Agriculture, College of: 25
Agricultural Biology, 27
Agricultural Economics and Rural Sociology, 26, 27, 28
Agricultural Engineering, 26, 28
Agricultural Extension Education, 29
Agricultural Mechanization, 28
Animal Science, 26, 29
Food Technology and Science, 30
Forestry, 31
Ornamental Horticulture and Landscape Design, 32
Plant and Soil Science, 26, 32
Veterinary Medicine, 12, 25
Wildlife and Fisheries Science, 31
Agricultural Biology, 27
Agricultural Economics and Rural Sociology, 26, 27, 28
Agricultural Education, 61
Agricultural Engineering, 26, 28
Agricultural Extension Education, 29
Agricultural Mechanization, 28
Agricultural, Institute of: 25
Agricultural Experiment Station, 25
Agricultural Extension Service, 25
Animal Science, 26, 29
Anthropology, 100
Appeals Procedure, 17
Application, 11, 12
Application Fee, 11, 13
Arabic, 137
Archaeology, 102
Architecture, School of: 34
Arrowmont School of Crafts, 90, 91
Art, 103
Art Education, 51
Assistantships, 15
Astronomy, 130, 131
Audiology, 104
Auditors, 13, 18
Automobile Registration, 16
Average, Required, 18
Aviation Systems, 95
Biochemistry, 106
Biology, 103
Biology, Agricultural, 27
Biology, Radiations, 136
Biomedical Sciences, 11, 147
Black Studies, 114
Board of Trustees, 7
Botany, 108
Broadcasting, 48
Bureau of Educational Research and Service, 50
Business Administration, College of: 35
Accounting, 38
Business Administration, 39
Business Law, 39
Economics, 40
Finance, 41
Management, 42
Management Science, 42
Marketing and Transportation, 43
Office Administration, 44
Statistics, 45
Business and Economic Research, Center for, 38
Business Education, 61
Business Law, 39
Calendar for 1979, 2
Campus Map, 4, 5
Candidacy, Admission to, 20, 21
Change of Program, 19
Change of Registration, 17
Chattanooga Engineering Program, 11
Chemical Engineering, 68, 69
Chemistry, 109
Child and Family Studies, 88
Civil Engineering, 71, 72
Classics, 112
Classification of Students, 14
Colleges:
Agriculture, 25
Business Administration, 35
Communications, 46
Education, 50
Engineering, 67
Home Economics, 87
Liberal Arts, 100
Nursing, 148
Committee, Doctoral, 21
Committee, Master's, 20
Communications, 47
Communications, College of: 46
Communications, 47
Advertising, 47
Broadcasting, 48
Journalism, School of; 48
Communications Research Center, 47
Comparative Literature, 113
Comprehensive Examination, 20
Computer Science, 113
Computing Center, 16
Consumer Studies and Housing:
Public Policy, 87
Continuing and Higher Education, 52
Continuous Registration, 21
Correspondence Directory, 3
Council, Graduate, 6
Counseling, Vocational Rehabilitation, 59
Course Numbers, 18
Course, Drop, Add, 17-18
Crafts, Interior Design and Housing, 89
Credit, Graduate, 17
Cultural Studies, 114
Curriculum, 52
Curriculum and Instruction, 52
Deferred Payment Fee, 13
Degree Requirements, 19-24
Degrees Available, 8, 9
Dissertation, 22
Distributive Education, 61
Doctor of Business Administration, 8-9, 21, 37
Doctor of Education Degree, 8-9, 22
Doctor of Philosophy Degree, 8-9, 21
Doctoral Committees, 21
Doctoral Languages, 21
Dropping Courses, 17-18
Ecology, 86
Economics, 40
Education, College of: 50
Administration and Supervision, 56
Agricultural, 61
Art, 51
Business, 61
Continuing and Higher Education, 52
Curriculum and Instruction, 52
Distributive, 61
Home Economics, 62, 93
Industrial, 62
Music, 51
Physical, 65
Psychology and Guidance, 57
Public Health, 63
Recreation, 66
Safety, 64
School Health, 64
Special Education and Rehabilitation, 58
Vocational-Technical Education, 60
Educational Administration and Supervision, 56
Educational Psychology and Guidance, 57
Educational Research and Service, 50
Administration, 52
Aerospace, 82, 84
Elementary Education, 52
Engineering Administration, 67
Engineering, College of: 67
Administration, 67
Aerospace, 82, 84
Chemical, 68, 69
Civil, 71, 72
Electrical, 75
Environmental Engineering, 72, 73
Experiment Station, 67
Industrial, 80
Mechanical, 82
Metallurgical, 68, 70
Nuclear, 85
Polymer, 68, 71
Science and Mechanics, 78
Engineering Program, Chattanooga, 11
Engineering Science and Mechanics, 78
English, 115
English Education, 52
English, Native, 19
Bronze, 12
Entry Requirements, 12
Environmental Engineering, 72, 73