Chemistry 3211-21-31* and 3219-29-39*).

5. A dissertation reporting the results of original and significant research carried out during the term of candidacy.

6. A final examination which will be concerned primarily with the student's dissertation.

Students who have passed the preliminary examination in the Ph.D. program may petition the department for award of a Master's degree. The additional requirements for such a degree shall be:

(a) the completion of at least 45 hours of approved course work for graduate credit, at least half of which must be at or above the 5000 level;

(b) the preparation of a research manuscript suitable for submission for publication in a major scientific journal;

(c) the oral defense of that manuscript before an examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department.

4119 Cellular and Comparative Biochemistry (2, 4) Electrolyte balance; the chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture; synthetic metabolism; nucleic acid functions; RNA and DNA and their relationship to the regulation of cell division; conformational change; structure-function correlation; protein degradation; mechanisms of gene expression; the replication, transcription, and translation processes. Must be taken in sequence. Prereq: Organic Chemistry and an introductory course in biology. 3 lectures and 1 discussion. 4120-20 Introduction to Physical Biochemistry (3, 3) 4210—Introduction to thermodynamics: phase stability and phase change; chemical potential; osmotic pressure; activity and the Debye-Huckel model; electrochemistry; membrane permeability. 4220—Elements of statistical mechanics: diffusion, collision theory; chemical kinetics; transition state theory; higher-order kinetics; the specialized kinetics of enzymatic processes; some bio-polymer conformational change; structure-function correlation; 4230 Introduction to Physical Biochemistry (3) Physical characteristics of macromolecules; polarization light; adsorption and fluorescence; sedimentation and transport hydrodynamics; spectroscopic properties; light scattering, and structural x-ray crystallography of proteins and nucleic acids. Prereq: Biochemistry 4220 or Chemistry 3430, or equivalent.

5000 Thesis

5010 Biochemical Techniques (2) Theory and laboratory practice in sedimentation, chromatography, and electrophoreis techniques in the isolation and characterization of macromolecules of importance in biochemistry and molecular biology. Prereq: 4119 or equivalent.


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

5130 Protein Structure and Enzyme Function (3) Physico-chemical properties of proteins; primary, secondary, tertiary and quaternary structure; denaturation, renaturation and other conformational change; structure-function correlations; enzyme-specific models of catalysis; enzyme structure, size, relaxation, and allosteric and allosteric reactions. Prereq: 4110 and either 4220 or Chemistry 3430.

5220 Structures and Functions of the Nucleic Acids (3) Chemistry of the nucleic acids; hydrogen bonding and double-stranded structures; coiling, supercoiling, and other higher order structural considerations; the biosynthesis of DNA's and RNAs; repair mechanisms; degradation mechanisms; mechanisms of gene information storage and retrieval. Prereq: 4110-20 or equivalent.

5230 Protein Synthesis and its Role in Metabolic Regulation (3) Mechanism of assembly of peptide 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, 2) A tutorial laboratory course in modern experimental methodology and instrumentation. In-tended primarily for doctoral level majors.

5450 Special Topics (1-3) Registration only by prior arrangement with department. May be repeated.

6000 Doctoral Research and Dissertation ADVANCED BIOCHEMISTRY SEMINARS

To be presented by students and staff, surveying special subjects not covered in detail in the formal lecture courses. One series will be presented each year in a three-year repeating cycle. May be repeated for credit with the permission of the department.

6110 Enzyme Kinetics and Mechanisms of Enzyme Action (1)

6120 Functions of the Vitamins (1)

6130 Functions of the Trace Elements (1)

6210 Structure and Function of Macromolecules (1)

6220 Biochemical Genetics (1)

6230 Metabolic Regulation (1)

6310 Biological Energy Transformations (1)

6320 Antigen-Antibody Interactions (1)

College of Liberal Arts 101

6330 Biochemistry of Specialized Physiological Processes (1)

6410-20-30 Current Topics in Biochemistry (2, 2, 2) Seminars and lectures dealing with current advances in the field of chemical biology. May be repeated with the consent of the department.

Biology

MAJOR DEGREE

MA.T.C. Biology

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 Chairman 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 M.A.T.C. degree in Biology will meet a minimum distribution of graduate and undergraduate courses as follows:

A. Eight quarter hours in each of the following:

1. Taxonomy and/or Ecology.

2. Morphology, Developmental Biology and/or Anatomy.

3. Physiology and/or Biochemistry.

4. Genetics, Cytology and/or Cyto-genetics.

B. Eighteen quarter hours of graduate credit in each of the following four fields: Biochemistry, Botany, Microbiology, Zoology, or 36 quarter hours of graduate credit among the four fields as specified by the interdepartmental committee administering the M.A.T.C. program in Biology.

C. At least 21 quarter hours of course work in requirement B (not including special projects and thesis) numbered at the 5000 or 6000 level.

D. At least nine quarter hours of Master's research and an acceptable thesis.

E. Total grade credit in the biological sciences (or appropriate supporting fields) of 57 quarter hours (including that in A, B, C and D).

F. A three quarter one-hour seminar or (or seminar series) on the problems and techniques of college teaching.

G. Six quarters of part-time, supervised college teaching-internship training.

H. A final comprehensive examination, oral, covering the thesis endeavor and the subject matter of the course requirements.
DOCTOR OF PHILOSOPHY DEGREE

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 5000.

2. Satisfactory performance on a written comprehensive preliminary examination.

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

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

5. Satisfactory completion of nine 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, etc., may be required by the individual student's faculty committee.

MASTER OF SCIENCE DEGREE

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

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

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


5. Presentation of a 30-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.

1 Alumni Distinguished Service Professor.

** Not for graduate credit for botany majors.

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4120 Plant Anatomy (4) Comparative structure of vascular plants. 1 hr and 3 labs. Prereq: Fundamentals of Botany.

4240 Paleobotany (4) Same as Geology 4240.

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

4550 Botanical Microscopy (4) Theory and methods of preparing living and preserved plant materials for light microscopy, employing fixation, staining, and such procedures as graphic and photographic techniques.

5000 Thesis

5012 Morphology and Evolution of the Phycomycetes (4) Similar to 5090, but dealing with the Phycomycetous fungi. Prereq: 5011 or consent of instructor.

5013 Morphology and Evolution of the Ascomycetes (4) Similar to 5090, but dealing with the Ascomycetous fungi. Prereq: 5011 or consent of instructor.

5017 Field Mycology (4) An intensive summer course in the field characteristics and morphology of higher fungi. Frequent field trips. Prereq: Consent of instructor. May be repeated.

5021 Bryology (4) Taxonomy, phylegogy, ecology of liverworts and bryophytes with an emphasis on field studies and current research. Prereq: 3020. 1 hr and 3 labs.

5022 Lichenology (4) Taxonomy, phylegogy, ecology of lichens and lichen communities with an emphasis on field studies and current research. Prereq: 3010, 5011 or 5017, and 5061 recommended. 1 hr and 3 labs.

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

5061 Phycology (4) An intensive, comparative study of the major divisions of algae, both freshwater and marine, including taxonomical, ecological, morphological, developmental and phylogenetic aspects. Field and laboratory studies emphasizing identification and classification; introduction to experimental phycology. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs.

5070 Principles of Biological Illustration (3) Principles and application of photography, including photomicrography and photomacrography, drawing graphs, and other methods to the recording and presentation for research and publication of data in pictorial or graphic form. 1 hr and 2 labs.

5080 Pieridology (4) Evolutionary study of the lower vascular plants, including morphology, cytology, ecology, life cycles and classification. Biosystematic studies and recognition of local species. Prereq: 3020-30, 2 hrs and 2 labs or field trips.

5090 Morphology and Evolution of Basidiomycetes (4) Discussion of structure and function of somatic and sexual life cycles as they apply to evolution in the group. Examination of cut-
5100 Experimental Cell Biology (4) Limited research problems with emphasis on drugs collected from among the following: analytical microscopy; electron microscopy; cytomorphology; fission; isolation and characterization of cellular organelles; culture, physiology, biochemistry and growth kinetics of cellular systems. Lecture and laboratories. Prereq: 5780 or Zoology 4310 and Biochemistry 4110-20. 1 hr and 3 labs.

5810 Cytogenetics (4) Changes in chromosomes and genes with relation to mutations, hybridization, speciation, and phylogeny. Prereq: General Genetics. 5780, or Zoology 4310. 2 hrs and 2 labs.

5820-21-22-23-24 Methods and Instrumentation in Laboratory Investigation (1, 1, 1, 1, 1) A laboratory course providing project experience and theoretical background in various currently used research methods. These may include ion-exchange resins, adsorption spectrometry, electron microscopy, polarography, zonal and ultra-centrifugation, phase chromatography, automatic analyzers, microscopy, culture methods, use and detection of radioisotopes and many others. A course in plant physiology, Organic Chemistry or equivalent, Elements of Physics or equivalent. S/N Only.

5830 Field Methods in Plant Ecology (4) Analysis of plants and their environments, including field experience. Prereq: 4310, 5340, 5350. 2 hrs and 2 periods (field trips).

5840 Microbes in Ecosystems (3) Microbial communities, their metabolic activity, mineral relationships, and interactions with biotic and abiotic factors in natural environments and microcosms systems. Prereq: 4310 and Microbiology 3000 or consent of instructor.

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

5910-20 Developmental Plant Morphology (3, 3) Developmental morphology of plants from the aspect of the phenomena of morphogenesis-correlations, polarity, symmetry, differentiation, regeneration, tissue changes, abnormal growth, environmental and genetic factors. Prereq: 3010-20 or 4120, and 3210 or 5210 for 5910. 5920: 5910 for 5920. 2 hrs and 1 lab for 5910; 1 lab for 5920.

6009 Doctoral Research and Dissertation

6010 Advanced Topics in Morphology of Vascular Plants (2-4) Needs of the student determine content. Topics will be selected from the broad categories of experimental anatomy, morphology and morphogenesis. Prereq: 3020-30, 4120, 5910-20 or consent of instructor. May be repeated with consent.

6060 Advanced Topics in Cryptogamic Botany (2-4) Advanced studies and current research in (a) experimental phycology, (b) mycology, (c) bryology, (d) spore studies, (e) developmental morphology of cryptogams. May be repeated with consent of the department.

6210 Photobiology (3) The interaction of nonionizing radiation with living systems. Prereq: Elements of Physics or equivalent; Biochemistry 4110.

6310 Advanced Topics in Cytology and Cell Biology (2-4) Requirements and interests of the students would determine topics, such as (1) actions of chemicals on actively dividing cells, (2) current ultrastructural research in selected cryptogamic organs and cellular systems, (3) photosynthesis, respiration, and biosynthesis of photosynthetic cell compounds and their metabolism including photosynthesis, respiration, and biosynthesis of photosynthetic cell compounds and their metabolism, (4) cellular control of nucleic acid biosynthesis. Prereq: 5780 or Zoology 4310; General Genetics; Biochemistry 4110-20. May be repeated with consent.


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

6620 Seminar in the History of Botany (2)

6630-40-50 Radiation Ecology (2, 2, 2) Use of radioisotopes for delineation of food chains, and estimation of energy flow and other eco-logical processes. Relations of ionizing radiation and other stresses on populations and communities of plants, animals, and microorganisms, elements in ecosystems, (3) experimental cytology, (4) cellular and biochemical cycles and dosimetry of isotopes released to air, land, and waters. Coreq: 6 hrs of ecology or Chemistry 3815 or Physics 4710.

6810 Advanced Topics in Plant Physiology (2-4) Requirements and interests of the students would determine content, including such topics as (1) growth and growth hormones; (2) minor element nutrition; (3) photosynthesis; (4) radiation effects. Prereq: 5210; one year of college physics. May be repeated with consent of the department.

6830 Advanced Topics in Ecology (2-4) Needs of the student determine the content, including such topics as the following: (1) animal ecology, (2) biogeochemistry; (3) bioclimatology; (4) gene-and paleoecology; (5) radiation ecology; and (6) system ecology. Prereq: 4310, 5340, 5590. May be repeated with consent of the department.

6930 Advanced Topics in Systematic Botany (2-4) Needs of the student determine the content, with such possible subjects as (1) morphological and evolution of vascular plants; (2) bibliosystems (systematic literature and the code of nomenclature); (3) experimental taxonomy; (4) current classifications and systems, (5) systems of classification. Seminars or lectures and labs depending on subject. Prereq: 3020-30, 4030 or consent of instructor. May be repeated with consent of the department.

Chemistry

MAJOR DEGREES

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

Professors: D. A. Shirley (Head), Ph.D. Iowa State; N. S. Bowman, Ph.D. Princeton; C. A. Buehler (Emeritus), Ph.D. California (Berkeley); G. K. Schreitwieser, Ph.D. Illinois; J. C. Collins, Ph.D. Northwestern; J. A. Dean, Ph.D. Michigan; J. F. Eastham, Ph.D. California (Berkeley); W. H. Fletcher, Ph.D. Minnesota; G. W. Keenan, Ph.D. Texas; D. C. Kleintelter, Ph.D. Princeton; M. H. Lietzke, Ph.D. Wisconsin; R. Livingston, D.Sc. Cornell; G. Mamantov, Ph.D. Louisiana State; G. D. O'Kelley, Ph.D. California (Berkeley); E. L. Wehry, Ph.D. Purdue; A. C. Feuge, Ph.D. Illinois; G. P. Smith, Ph.D. Virginia; H. A. Smith, Ph.D. Harvard; W. T. Jenney, Ph.D. Ohio State; W. A. Van Hook, Ph.D. Johns Hopkins; T. F. Williams, Ph.D. London; J. H. Wood 'Emeritus, Ph.D. North Carolina.

Associate Professors: J. F. Bloor, Ph.D. Wisconsin; J. Q. Chambers, Ph.D. Kansas; C. A. Lane, Ph.D. California (Berkeley); J. W. Larsen, Ph.D. Purdue; R. M. Magid, Ph.D. V. O. Johnson, Ph.D. California (Berkeley); E. L. Wehry, Ph.D. Purdue.

Assistant Professors: J. L. Adcock, Ph.D. Texas; F. A. Grimm, Ph.D. Cornell; W. Kabalke, Ph.D. Purdue; J. F. Kinsie, Ph.D. Akron; L. J. Magid, Ph.D. Tennessee; R. M. Pagani, Ph.D. Wisconsin; J. L. Peterson, Ph.D. Indiana; C. Woods, Ph.D. North Carolina State;

1 Alumni Distinguished Service Professor.
Students majoring in chemistry for the Master's or Doctor's degree are required to present as a prerequisite one year each of general, analytical, organic and physical chemistry with the satisfactory completion of:

1. Research and a thesis to give nine 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 a related field to make an overall total of 45 hours.

These additional hours must include one of the following: 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 three credit hours of seminar may be applied to the above requirements.
5. A final oral examination.

A program leading to the M.S. degree with specialization in Polymer Science is conducted jointly with the Department of Chemical and Metallurgical Engineering, which offers a degree with similar specialization. This specialization requires satisfactory completion of:

1. Research and a thesis to give nine to 18 hours of graduate credit (5000).
2. Chemistry 4160-70, 5511, 5140-50, Chemical Engineering 4910.
3. Sufficient additional graduate course work in chemistry and/or related fields to make an overall total of 45 hours.
4. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
5. A final oral examination.

The requirements for the M.S. 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.
3. Participation in seminar (5911-21-31) during the entire period of graduate study and a six-month internship in a governmental or industrial laboratory.
4. Forty-nine hours of additional graduate course work including six hours at the 6000 level. For emphasis in environment, these additional courses must include Chemistry 5250-59-60-69-70-79, Ecology 5310, Environmental Engineering 3000, plus selected courses from other areas of chemistry, environmental engineering, meteorology, microbiology, health physics, ecology, computer science, statistics, and industrial health.

For emphasis in energy, these additional courses must include Chemistry 5410, a chemistry sequence: Chemistry 5110-20-30-35 or 5250-60-70 or 5420-30 or 5710-20-30, 5810, Geology 5810, Mechanical Engineering 4140, plus other course selections from areas such as catalysis, heterogeneous equilibria, kinetics, thermal science, combustion and propulsion engines, resource economics, nuclear engineering, and electrical engineering. All course selections must be approved by the appropriate departmental committee.
6. A comprehensive advanced examination.
7. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
8. 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.

The program in chemical physics is conducted jointly with the Physics Department which offers a similar degree. A program leading to the Ph.D. degree with specialization in Polymer Science is conducted jointly with the Department of Chemical and Metallurgical Engineering, which offers a degree with similar specialization. This specialization requires satisfactory completion of:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70, 5531, 5140-50, 5160 or 5170, Chemical Engineering 4910.
3. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
4. Thirty hours of additional graduate course work, including at least six hours and the last three 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) The compounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Must be taken in sequence. Prereq: General Chemistry. The corresponding laboratory (3219-29-39) is a coreq 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. The corresponding lecture (3211-21-31) is a coreq 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. The corresponding courses (3420 and 3430) are corequisites. 1 lab.

*3511-21-31 Principles of Organic Chemistry (3, 3, 3) Structure and reactivity of aliphatic and aromatic compounds emphasizing reactions of synthetic utility. Use of spectroscopic and physical techniques to elucidate reaction mechanisms. Recommended for chemistry majors and students planning careers in physical or biological sciences. Must be taken in sequence. Prereq: General Chemistry. Coreq: Corresponding laboratory: 3219-29-39; or 3219, with 3219-29-39 as a corequisite. The latter is recommended.

*3529-39 Organic Chemistry Laboratory (1, 1) Experiments on topics discussed in 3221-31. Similar to 3229-39 except designed for students who have need for operating knowledge of various spectroscopic and chromatographic techniques. Corresponding lecture (3221-31-31) is a corequisite 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 techniques, tracer procedures and safety precautions in agriculture, biology, medicine, nutrition, etc. Not for credit by chemistry or physics majors or minors. Prereq: 1 year of general mathematics or equivalent, 1 year of general chemistry. 2 hrs and 1 lab.


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

4160-70 Intermediate Physical Chemistry (3, 3) (Designed for chemistry graduate students who have had one year of physical chemistry.) 4160—The three laws of thermodynamics, phase equilibria and statistical thermodynamics, quantum mechanics. 4170—Gases and kinetic theory, chemical kinetics, molecular spectroscopy, and introduction to chemical statistics.

4210 Advanced Analytical Chemistry (3) Chemical separations including chromatography, ion exchange and solvent extraction; spectrophotometric techniques. Prereq: Analytical chemistry.

4219 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4210. Coreq: 4510.

4220 Advanced Analytical Chemistry (3) Electroanalytical methods of analysis (including potentiometry, coulometry, polarography, and voltammetry); magnetic resonance methods; mass spectrometry; x-ray absorption and fluorescence techniques. Prereq: Analytical chemistry. Recommended: 3420 or 4920.

4229 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4220. Coreq: 4220.

4240 Physical Inorganic Chemistry (3) The fundamental theoretical concepts leading to an understanding of inorganic chemistry; the quantum theory of the atom, principles of molecular mechanics, and elementary nuclear chemistry. Prereq: 3420-31, 4110.

4430 Intermediate Inorganic Chemistry (3) Detailed application of theoretical concepts of the inorganic elements, their chemical states, and their reactions. Prereq: 4420.

4510 Organic Qualitative Analysis (3) Identification of compounds and mixtures. Prereq: 3211-21, 3219-29-39 or 3219, 3239-39. 3 labs. Not open to students who have completed 4610.

4550 Organic Reaction Mechanisms (3) Theory of bonding and reaction mechanisms. Prereq: 1 year of organic chemistry.

4610-20 Advanced Chemical Experimentation (2, 2) Laboratory course in application of modern experimental techniques to solution of chemical problems. Techniques of synthetic organic and inorganic compounds with emphasis on independent study using advanced laboratory techniques. Corresponding lecture (4610) is corequisite. 3400-39, 4220. Not open to students who have completed 4510.

4640 Electronics for Chemists (4) Includes data processing, and special problem areas. Prereq: 5250 for 5259; 5260 for 5279. 5270 for 5279.


5120 Advanced Organic Chemistry Laboratory (3) Experiments on topics discussed in 5110-20-30-35. 3 labs. Not open to students who have completed 4510.

5130-20-30 Research in Chemistry (3, 3, 3) Special reading, consultation and laboratory. Prereq: 3529-39. (Not applicable to formal course requirements.)

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

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

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

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

5240 Electronics for Chemists (4) Includes the material of Chemistry 4640 plus a special project. Prereq: Consent of the Instructor.

5250-60-70 Advanced Analytical Chemistry (3, 3, 3) 5250—Absorption and emission spectrophotometry, structure elucidation by IR, NMR, UV, and mass spectra; 5260—Chemical separation methods and instrumental methods covered in the concurrent lecture course. Prereq: 1 year of physical chemistry. Coreq: 5259. 5259 for 5260; 5260 for 5279. 5279 for 5279.

5280-90 Clinical Chemistry (3, 2) Introduction to clinical chemistry, significance of physiologic parameters, electrolytic balance, metabolic dysfunctions, analytical methodology, data processing, and special problem areas. Prereq: Biochemistry 4110; 1 year of instrumental and separation methods of analysis. Coreq: Biochemistry 4120 or equivalent.

5290-90-90-90 Clinical Chemistry Laboratory (1, 1, 1, 1) Experiments in the use of chemical separation methods and instrumental methods covered in the concurrent lecture course. Prereq: 1 year of physical chemistry. Coreq: 5259. 5260 for 5259; 5260 for 5279; 5279 for 5279.

5310-20-30 Research in Chemistry (3, 3, 3) Special reading, consultation and laboratory. Prereq: 3529. (Not applicable to formal course requirements.)

5440-50-60 Quantum Chemistry (3, 3, 3) An introduction to the principles of quantum mechanics with special emphasis on applications to chemical systems of interest to organic and inorganic chemists. Molecular orbital theory and ligand field theory from the basic frames of reference. Prereq: 4110 or equivalent.

5450-60-70 Advanced Physical Chemistry (3, 3, 3) Application of the principles of quantum mechanics to problems of special interest on the molecular level. Prereq: 4110 or 4160-70.

5460 Experimental Methods of Infrared and Ultraviolet Spectroscopy (3) (Same as Physics 4450.)


5480 Radiation Chemistry (3) Interaction of high-energy radiation with matter. Not for credit by chemistry majors.
radiation chemistry of water and aqueous solutions; gas-phase radiolysis; liquid organic compounds; solid state reactions. Prereq: 5430 or Physics 4610, 4720-30. (Same as Physics 5460.)

5480 Molecular Spectroscopy Laboratory (3) Experimental study of nuclear magnetic resonance, infrared, Raman and electronic spectra. Prereq: 4110 or 4170. 1 hr and 2 labs.

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

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

5531 Survey of Organic Chemistry (3) Bonding in organic molecules, chemistry of hydrocarbons, aliphatic compounds and conformational analysis, monofunctional oxygenated derivatives, carboxyl compounds, stereochemistry, aromatics, and spectral analysis of organic molecules by infrared, ultraviolet, nuclear magnetic resonance and mass spectral techniques.

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

5740 Advanced Inorganic Chemistry Laboratory (3) Techniques of crystallization, distillation, furnace methods, electrolytic processes and gas handling as involved in the synthesis of metals, alloys, coordination compounds, polyacids, anomalous salts and colloids. Prereq: 1 yr of physical chemistry. 1 hr and 2 labs.

5810 Nuclear Chemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiations and matter, radiation detection. Prereq: 1 year of physical chemistry.

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

6000 Doctoral Research and Dissertation

6110 Stereochemistry (3) Influence of dimensions of groups and configuration of molecules on the reactions of organic compounds. Prereq: 5110-20-30.

6111 Selected Topics in Organic Chemistry (3) Subject matter varies among important topics of current significance. Prereq: 5110-20-30. May be repeated.


6180 Alkaloids (3) Structure elucidation of nitrogenous bases derived from the plants. Prereq: 5110-20-30.


6210 Topics in Analytical Chemistry (3) Advanced instrumental methods including emission spectroscopy, infrared, mass spectrometry, x-ray, nuclear magnetic resonance, etc., with emphasis on molecular functionality. Prereq: 5210-20 or consent of instructor.

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: 5250-60-70. May be repeated.

6220 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.

6430 Photochemistry (3) Photoactivation and properties of photoactivated molecules, photoisomerization of organic and organic compounds and photoexcitation. Prereq: 5410-20-30.

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

6460 Analytic Chemistry (3) Theory of contact catalysis and the application of catalysis to various chemical processes. Prereq: 5410, 5430, 5450.

6480 Statistical Thermodynamics (3) Statistical derivation of thermodynamic laws and application of statistical mechanical methods to systems of chemical interest. Prereq: 5410, 5430, 5450; Physics 3210-20; Mathematics 4540, 4610.

6510 Thermodynamics of Solutions (3) The theory of regular solutions and of electrolyte solutions; measurement of activity coefficients and other thermodynamic properties; selected topics from the 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: 5420 and either 5540 or Physics 5210.

6710 Crystal Chemistry (3) Laws governing arrangement of atoms and ions in solids and influence of arrangement and electronic structure upon physical and chemical properties of solids. Prereq: 5410, 5430, 5450 or 5710-20-30.

6711 Selected Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance. Prereq: 5710-20-30. May be repeated.

6730 Topics in Quantum Chemistry (3) Continuation of quantum infrared, mass spectrometry, and other topics in quantum mechanics as applied to chemical theory.

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

6810 Vibrational Problems in Molecular Spectra (3) Normal coordinates; group theoretical methods; potential functions; resonance; Wilson F & G matrices; selection rules; and Raman spectra or crystals. Prereq: 5340-50, 5420, or consent of instructor. (Same as Physics 6810.)

6811 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance. Prereq: 5810. May be repeated.

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 Professor: M. L. Henbest, M.A. Arkansas.


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

3910 Plato (3)

3920 Herodotus (3)

3930 Euripides (2)

4020 Aeschylus; Sophocles (3)

4030 Lysias (3)

4040 Aristophanes (3)

4050-60-70 Directed Readings in Greek (3, 3, 3)

5210-20-30 Greek Drama (3, 3, 3) Aeschylus, Sophocles, Euripides, Aristophanes.

Latin

3440 Livy (3)

3450 Pliny and Martial (3)

3460 Elegiac Poets (3)

4110 Seneca, Essays and Letters, or Tragedies (3)

4120 Horace, Satires and Epistles (3)

4130 Catullus, Martial (3)

4310 Readings from Medieval Latin (3)

4320-30 Selected Readings from Latin Literature (3, 3) (Latin 4310-20-30 will coordinate with Latin 4110-20-30) May be repeated.

4340 Horace, Odes (3)

4350 Tacitus (3)

5310 Seminar in Caesar (3) Reading in the writings of Caesar, including the Gallic Wars. Recommended for teachers. Summer.

5410-20-30 The Latin Epic: Lucretius, Vergil, Lucan (3, 3, 3)

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

GENERAL COURSES

3310 Art and Archaeology of the Aegean Bronze Age and Early Greece (3) Troy, the Cyclades Islands, Greek mainland, and Crete. Emphasis on palaces of Crete and Mycenae, Tiryns, and Pylus, their fall, the following
Dark Age, and rebirth of Greek civilization. Illustrated lectures.

3320 Art and Archaeology of Arcadic and Classical Greece (3) Survey of development of Greek architecture, sculpture, and painting from 650 B.C. to death of Alexander. Illustrated lectures.

3330 Art and Archaeology of Hellenistic Greece and Rome (3) Hellenistic Greek, Etruscan, and Roman sculpture, painting, and architecture, with attention to city planning. Illustrated lectures.

3340 Cities of the Greek and Roman World (4) Archaeological survey of Greek and Roman cities from 600 B.C. to 500 A.D. with emphasis on development of city planning and quality of life. Such cities as Mycense, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied.

3350 Shrines and Sanctuaries of the Greek and Roman World (4) Survey course with emphasis on archaeological remains such as Olympia, Epidaurus, Paestum, Cumae, Praeneste, and Baalbek.

4010 Greek Drama in English Translation (3) Survey of dramatic masterpieces of Greek.

4210 The Teaching of Latin (3) Carries no language credit. Purposes, techniques, materials, and evaluation; directed observation in public schools; preparation of teaching plans and materials.

4220 Seminar in Classical Studies (3) Special problems in the literatures and the other arts of Greece and Rome. May be repeated with consent of department.

4230 Classical Mythology and Its Uses (3) An intensive review and study of Greek and Roman mythology. Emphasis on the uses of classical mythology in literature, music, and the plastic arts, especially of modern times.

4510 Selected Readings in Latin Literature in Translation (3) Content varies; may be repeated with consent of department.

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

Comparative Literature

H. C. Rutledge, Chairman

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

4050-60-70 Dante and Medieval Culture (3, 3, 3) Readings and lectures in English for students majoring or minoring in other departments. (Same as Italian 4050-60-70.)

5012 Comparative Theories of Literature (3) Croce, Richards, Frye, Wellek, and others. Prereq: Completion of three literature courses in a foreign language above 3000, or the equivalent.

5022 Approaches in Comparative Literature (3) The French and American schools: "comparative literature" vs. "general literature"; Vasconcelos, Guedes, Bakdansperger, Wellek. Prereq: 5012; completion of three literature courses in a foreign language above 3000, or the equivalent.

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

Computer Science

MAJOR

Computer Science

DEGREE

M.S.

Professors: R. T. Gregory (Head), Ph.D. Illinois; R. E. Bodenheimer, Ph.D. Northwestern

(Electrical Engineering); R. E. Cline, Ph.D. Purdue (Mathematics); F. Donaldson, Ph.D. Texas; R. J. Plemmons, Ph.D. Auburn (Mathematics); G. R. Sherman, Ph.D. Purdue (Director of Computing Center).

Associate Professors: R. M. Aiken, Ph.D. Northwestern; A. O. Bishop, Ph.D. Chemistry; R. M. Plumlee, Ph.D. Mathematics; R. C. Gonzalez, Ph.D. Florida (Electrical Engineering); C. E. Hughes, Ph.D. Pennsylvania State.

Assistant Professors: A. M. Davis, Ph.D. Illinois; C. P. Huang, Ph.D. SUNY (Buffalo); S. R. Jordan, Ph.D. Wisconsin; P. F. Linhus, Ph.D. Wisconsin (Computer Sciences Division, Union Carbide Nuclear Division, Oak Ridge); J. M. Moshelli, Ph.D. Ohio State; C. P. Pieper, Ph.D. Pennsylvania State; J. R. Pinkett, Ph.D. Wisconsin; D. W. Straight, Ph.D. Texas; M. G. Thomson, Ph.D. Duke.

ENTRANCE REQUIREMENTS TO M.S. PROGRAM

1. Mathematical maturity at least equivalent to that of a student who has completed a 2-year calculus sequence.

2. Computer Science 3150 (or C. S. 3155) or an equivalent introductory numerical mathematics.

3. Statistics 3450 (Statistics for Engineering) or Math 3050.

A graduate minor in Computer Science may be obtained by completion of nine hours of resident credit in computer science course work numbered above 4000 and approved by both major department and the computer science faculty.

REQUIREMENTS FOR THE M.S. DEGREE

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

1. C. S. 4410-20-30
2. EE 5615-25-35 (These courses may not be used to satisfy 5000-level requirements specified below; however, they do count towards the 45 total graduate level credits required of all M.S. candidates.)
3. C. S. 4010 and 4510 or C. S. 4035-45 or C. S. 4225-35 (the latter two sequences to be taken by students interested in concentrating in numerical analysis). The student may then select either Plan A or Plan B:

Plan A. Thesis Option.

1. Completion of 36 hours of courses at the 4000 level or above, including at least 18 hours at the 5000 level in addition to the above 5000 level required courses.

2. Completion of at least nine additional hours of thesis credit, C. S. 5000.

3. Pass an oral examination administered by a committee of at least three faculty members.

Plan B. Non-Thesis Option.

1. Completion of 45 hours of courses at the 4000 level or above, including at least 27 hours at the 5000 level in addition to the above 5000-level required courses.

2. Pass written and oral comprehensive examinations.


3030 Introduction to Structured Programming (4) Intermediate computer programming. Use of general purpose language such as PL/1. Not intended for those with knowledge of FORTRAN should take 3155. (Same as Math 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. Coreq: Multivariable Calculus and Matrix Algebra. 2 hrs and 1 lab. 3150 and 3155 may not both be taken for credit; students with knowledge of FORTRAN should take 3155. (Same as Math 3155.)

4010 Discrete Structures and Logical Foundations of Computing (3) Sets, relations, orderings, propositional and predicate logic, functions and computable functions; graph theory and its applications to computer systems; introduction to the theory of computing machines and computing languages. Prereq: 3150 or consent of instructor.

4200 Introduction to Algorithms, Languages, and Automata (3) Introduction to finite automata, "effective procedures" and algorithms; Turing machines; formal languages and grammars. Prereq: 4010 or equivalent.

4035-45 Introduction to Numerical Linear Algebra (3, 3) Introduction to numerical methods for solving systems of linear equations; linear least-squares methods and eigenvalues. Coreq: 3150 or 3155. (Same as Math 4035-45.)

4225-35 Introduction to Numerical Analysis (3, 3) (Same as Math 4225-35.)

4310 Computation in Statistical Analysis (3) Use of digital computer in statistical analysis, such as frequency tabulations, percentile and data reduction, correlation and regression, analysis of variance. Elementary programming in a problem-oriented statistical language, e.g., FORTRAN. Use of statistical packages. Not intended for persons who have credit for a computer course. Not for credit for Computer Science majors or minors. Prereq: Probability and statistics or equivalent.

4320 File Maintenance and Data Processing (3) Not for credit for Computer Science majors. Applied computer programming. Error analysis of FORTRAN programs, overhead structures, maintenance of tape and direct access information storage files, use of utility programs, sort and merge. Prereq: 1 course in FORTRAN programming.

4330 Special Problems in Applied Programming (3) Applied programming in area of student's primary interest, using the digital computer. To be directed jointly by Computer Science faculty and student's faculty advisors. Prereq: 4320 or equivalent. Not for credit for Computer Science majors. May be repeated. Maximum 9 hrs.

in addition to the above 5000-level required courses.

2. Pass written and oral comprehensive examinations.

4410 Computer Organization and Programming I (3) Problem formulation and advanced programming in procedure oriented languages such as FORTRAN IV, COBOL, PL/I; operation and control of digital computers. Assumes knowledge of FORTRAN programming language. Prereq: Elec. Engr. 2710 or consent of instructor.


4430 Computer Organization and Programming III (3) Computer organization and advanced programming. Machine language and design of computers, representation of information, software, system, input/output systems, interpreters, macro assemblers, compiler techniques and language specifications. Prereq: 4420 or equivalent.

4510 Data Structures and Nonnumeric Programming (3) A study of data structures and algorithms for their manipulation. Arrays and orthogonal lists; stacks, queues, rings, doubly-linked lists, trees, dynamic storage allocation; organization of files; programming languages for information structures. Prereq: 4420 or consent of instructor.

4610-20 Operating Systems (3, 3) Hardware interrupt systems and concurrence of input/output operations; multiprogramming; operating system and program monitors; multiprogramming systems, memory management, protection, resource allocation and control, job management and task management; real time systems, time sharing systems, paging, virtual memory, schedulers, reliability; multiprocessing systems, graceful degradation; file management services, system accounting. Prereq: 4430. Coreq: 4510.

4850 Small Computer Systems (3) (Same as Electrical Engineering 4850.)

4910 System Management (3) System analysis and design; system implementation; system justification; personnel in systems; perspective on systems. Prereq: 4420 or equivalent.

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

5000 Thesis

5010 Computer Assisted Instruction (3) Study of the history and development of CAI systems. Emphasis on studying success and failure of major projects as well as investigating future role CAI will assume in education. Research projects involve use of a CAI programming language to implement a CAI course. Prereq: 4410 or consent of instructor.

5050 Computer Modeling and Simulation of Physical Systems (3) Techniques for computer modeling and simulation. Inputs, driving functions, errors, outputs, interactive simulations as applied to various physical systems. Models to represent special relationships. Prereq: 3150 or 3155, 4420 and Statistics 3450.

5210 Introduction to Artificial Intelligence (3) Approaches to automatic problem solving. State space representations of problems. Search and reduction methods. Theorem-proving methods by computer. Examples of programs that play chess, checkers, and other games. Practical applications. Computer simulation of elementary artificial intelligence problems. Prereq: 4010 or 4510 or consent of instructor. (Same as Elec. Engr. 5690.)

5410 Theory of Formal Languages (3) Investigation of formal languages for use in the development and description of features of programming languages. Formal grammars and languages, syntax and semantics of programming languages, structure of ALGOL and EULER. Prereq: 4010 or equivalent.

5420 Formal Languages and their Relation to Automata Theory (3) Formal languages and their relation to the family of types of automata based on their ability to translate (accept) different languages. Acceptors and transducers, finite state and finite store acceptors, deterministic and non-deterministic automata, regular expressions. Prereq: 5410.

5430 Compiler Design (3) Traces development of major components of a compiler using the constructs provided by formal language theory. Recognizers, symbol tables, semantic routines, constructs provided by formal language theory. Prereq: 4430. Recommended: 5410 and 5420.

5455 Finite Difference Methods for Partial Differential Equations (3) (Same as Math 5455.)

5465 Mathematical Aspects of the Finite Element Method (3) (Same as Math 5465.)

5585-85-75 Numerical Mathematics (3, 3, 3) (Same as Math 5665-65-75.)

5670-80 Advanced Operating Systems (3, 3) Principles of design and implementation for understanding and designing modern operating systems. Abstract models. Topics include: concurrency, mechanisms for automatic resource allocation, sharing, multiplexing, remote conversational access, long-term storage, protection, measurement and evaluation. Prereq: 4430 or equivalent and consent of instructor.

5710-20 Automata Theory (3, 3) Survey of mathematical methods of computation, multiple tape automata, Turing machines and recursive functions, computational complexity, the classification of automata and the algebraic structure of finite state machines. Prereq: 4010 or equivalent.

5810 Information Organization and Retrieval (3) A study of the structure, analysis, organization, storage, searching and retrieval of information, information analysis and dictionary construction; dictionary operations; syntactic language analysis operations; retrieval process; information search and matching procedures; automatic information dissemination systems; database retrieval systems. Prereq: 4430 or 4510.


5910-20-30 Special Topics in Computer Science (1-3, 1-3, 1-3) May be repeated. Maximum 9 hrs.

5940-50 Advanced Small Computer Systems (3, 3) (Same as Elec. Engr. 5940-50.)

5970-80-90 Seminar (1-3, 1-3, 1-3) May be repeated. Maximum 9 hrs.

Cultural Studies

Black Studies

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

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

4500 Current Issues and Topics in Black Studies (3-4) Problems, topics and issues in the area of Black Studies. The course content and credit will be determined by the instructor. May be repeated. Maximum 8 hrs.


4880 Afro-American Psychology (4) (Same as Psychology 4880.)

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 157.

5103 Independent Study (1-12) See page 138.

Economics

See College of Business Administration.

English

MAJOR

DEGREES

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

Professors:

J. H. Fisher, Ph.D. Pennsylvania; P. G. Adams, Director, Graduate Program, Ph.D. Texas; K. Curry, Ph.D. Yale; R. B. Davis, Ph.D. Virginia; R. Y. Drake, Jr., Ph.D. Yale; J. A. Hanson, Ph.D. Yale; T. M. King, Ph.D. Duke; F. D. Miller, Ph.D. Virginia; J. E. Reese (Chancellor), Ph.D. Kentucky; N. J. Sanderson, Ph.D. Shakespeare Institute, Stratford-upon-Avon; B. T. Stewart, Ph.D. Northwestern; T. V. Wheeler, Ph.D. North Carolina; N. Wright, Ph.D. Yale.

Associate Professors:


Assistant Professors:

J. A. Armistead, Ph.D. Duke; L. S. Burghardt, Ph.D. Chicago; D. R. Cox, Ph.D. Missouri; B. J. Gaines, Ph.D. Wisconsin; R. T. Goode, Ph.D. Texas; D. F. Goslee, Ph.D. Yale; N. M. Goslee, Ph.D. Yale; M. A. Lotar, Ph.D. Maryland; M. P. Richards, Ph.D. Wisconsin; F. K. Robinson, Ph.D. Texas.

Detailed information about the Master's and Doctor's programs may be obtained by writing the Director of the Graduate Program in English, McClung Tower. For admission forms, write to the Graduate School.

THE MASTER'S PROGRAM

The departmental requirement for the normal M.A. degree in English is a thesis, 36 quarter hours of courses and evidence of proficiency in one foreign language. 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.

Students seeking the Master of Arts without a thesis may substitute nine hours of 5000-6000 courses for the thesis, making a total of 45 hours.

For the degree of Master of Arts in College Teaching, 45 quarter hours are required, plus six hours in special courses designed for M.A.C.T. students and evi-
dence of proficiency in one foreign language. Candidates must also write a thesis or take an additional nine quarter hours of 5000-6000 level courses.

The language requirement may be fulfilled in one of the following ways:

a. The completion, before beginning graduate study, of a second year of a language in college with a grade of C or better.

b. The completion of French 3030 or German 3030, at The University of Tennessee, with a grade of B or better.

c. The passing of the regular Ph.D. language examination as currently administered.

Registration in any course in the 5000 or 6000 series may be repeated for credit with the permission of the department. That is, courses having the same number, but with differing subject matter, may be taken with each separate subject description.

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 24 quarter-courses (or their equivalent) in English: 12 courses at the 3000 level; six additional courses at the 5000-6000 level; and six courses for graduate credit at any level, including the 3000-4000 level. In addition, three courses must be taken for graduate credit in a subject other than English. Upon recommendation of the department, doctoral candidates may include M.A. thesis credits as part of the required course hours.

After the course work and the two language examinations are completed, the doctoral candidate will take four preliminary comprehensive examinations from six areas designated as the department directs. Successful completion of these examinations will be followed by the writing of the dissertation and an oral examination.

*1111 Written and Oral English for Foreign Students (6) An overview of Structural elements of English and written English. Required during the first quarter of residence of all foreign students (graduates, undergraduates, and transfer students); who are not excused from it on the basis of the English Proficiency Examination required of every new foreign student. Meets 10 hrs a week.

*1112 Written and Oral English for Foreign Students (3) Emphasis on the more advanced structural elements of English grammar and on paragraph writing. Required during the first quarter of residence of foreign students who on the basis of the English Proficiency Examination demonstrate need for work in English structure, but not at the intensive level of English 1111. Meets 5 hrs a week. Replace English 1110 for under-graduate foreign students.

*1121 English Composition for Foreign Students (3) Composition and reading for students whose native language is not English. Emphasis on paragraph writing, paragraph and theme structure with attention to grammar and mechanics. Prereq: English 1111 or recommendation based on English Proficiency Examination.

*1131 English Composition for Foreign Students (3) Typical writing problems encountered by foreign undergraduate and graduate students in English and to the writing of research papers. Prereq: English 1121 or recommendation based on English Proficiency Examination.

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

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


3150 Melville (3)


3411-12-20-30 Modern Drama (3, 3, 3, 3) 3411—Continental to 1930. 3412—Continental since 1930. 3420—British. 3430—American. (Graduate credit normally limited to students in Speech and Theatre.)

3510 Sixteenth-Century Prose and Poetry: More and Wyatt to Spenser (3)

3520-30 Elizabethan and Jacobean Drama (3, 3)

3610 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 The Literature of the English Bible (3)

3810-20-30 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. 1580-1601, including 1 Henry IV, Twelfth Night, and 1 Henry VI. 4020—Later plays, 1601-1613, with emphasis upon tragedies and dramatic romances.

4050-60 The American Novel (3, 3) 4050—From the earliest, sentimental novels through Brown, Cooper, Kennedy, and the major figures to 1875. 4060—From Henry James and Mark Twain through Faulkner and Hemingway.

4210-20-30 Victorian Poetry (3, 3, 3) 4210—Tennyson and the Pre-Raphaelites. 4220—Browning. 4230—Arnold, Clough, Fitzgerald, and others.

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

4430 Modern English Grammar (3) New approaches with emphasis on the generative transformational approach.

4440 Language in Society (3) Methodology and significant discoveries of sociolinguistics in America.

4450 Dialectology (3) Theories and methodologies of dialect research, fieldwork and analysis. Prereq: Varieties of English or consent of instructor.

4610 Special Topics in English Linguistics (3) May be repeated with consent of department.

4510 Introduction to Literary Criticism (3)

4610-20-30 Black Literature (3, 3, 3) Trends and developments.

4651 Southern Literature from 1585 to 1860 (3) The beginning of writing in the South, especially in its relations to the formation of a regional or southern tradition in literature.

4652 Southern Literature from 1860 to 1970 (3) Humorists, local colorists, and realists of the later nineteenth century and of the New South; emphasis upon the southern flowering of 1920-1950; recent trends.

4660 Emerson and Thoreau (3) Selected writings of American Transcendentalism.

4680 American Humor through Mark Twain (3)

4720 Introduction to Folklore (3)

4730 The Popular Ballad (3)

4850 Milton (3) Emphasis on major poems.

4860 Seventeenth-Century Prose and Poetry: Bacon, Donne to Marvell (3)

4910 Chaucer—Early Poems and Trolus and Criseyde (3)

4920 Chaucer—The Canterbury Tales (3)

4950 Approaches to Literature (3) Basic knowledge and techniques necessary to understand and evaluate various kinds of imaginative literature.

4960 Advanced Composition and Rhetorical Analysis (3) Reading and analysis of selected prose models, study of rhetorical principles, practice in various forms of writing.

5000 Thesis

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 137.

5103 Independent Study (1-12) See page 138.

5110-20 Tutorial in English (1, 1, 1) Observation of courses in freshman and sophomore English, grading of papers, supervised teaching, weekly conferences or seminars on the teaching of the college English. Prereq: Consent of instructor. Required of M.A.C.T. candidates. S/NC only.

5150 Old English Prose (3)

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

5210-20-30 Readings in American Literature from the Colonial Period to the Present (3, 3, 3)

5410-20-30 Readings in Middle English Literature (3, 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 (4, 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)

5860 Introduction to Literary Research (3) Critical examination of the aims of English studies, the profession of the English teacher, theory of literature, and methods of research, including collecting of information, evaluation of material, and transmitting of the results of scholarship.

5910-20-30 Readings in English and American Literature of the Twentieth Century (3, 3, 3)

6000 Doctoral Research and Dissertation
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.


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

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

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

3520 The Atmospheric System and Man (4) Overview of general circulation system leading to world pattern of climates. Role of climate in agriculture, architecture, human comfort and economic activity.

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

3610 Political Geography (4) Importance of geographic factors for understanding political relationships within and between nations; spatial implications of political decision-making process; geography of administrative units.

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

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

3800 Geography of South America (4)

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

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

3920 Geography of the American South (4)

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

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

4101 Foreign Study (1-16) See General Catalog.

4102 Off-Campus Study (1-16) See General Catalog.
United States (3) Intensive work in the delimitation and analysis of one or more selected regions of the United States. The regions involved will change from offering to offering. May be repeated with consent of instructor.

5320 Advanced Regional Geography of the South (3)

5410-20 Advanced Economic Geography (3, 3)

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

5550 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methods in geography of land-surface system. May be repeated for credit with permission of instructor. Prereq: 3530 or consent of instructor.

5610 Topics in Climatology (3) Examination of trends, problems, and methods in modern climatology. May be repeated for credit with permission of instructor. Prereq: 3530 or consent of instructor.

5710 Seminar in Geography (3)

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

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

5910 History of Geography (3) Development of geography from ancient Greece to present. Emphasis upon major contributors and their works. Prereq: Consent of Instructor.

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

6000 Doctoral Research and Dissertation

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

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

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

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

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

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

6610-20 Seminar in Regional Geography of Latin America (3, 3)

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

**Geological Sciences**

**MAJOR DEGREES**

Geology M.S., Ph.D.

Professors:

G. Briggs (Head), Ph.D. Wisconsin; H. J. Kiepser, Ph.D. Ohio State; O. C. Kopp, Ph.D. Columbia; R. E. McLaughlin, Ph.D. Tennessee; R. M. Perham, Ph.D. Michigan; D. H. Roeder, Ph.D. (Geology); J. G. Walls, Ph.D. North Carolina.

Associate Professors:

G. M. Clark, Ph.D. Pennsylvania State; L. A. Taylor, Ph.D. (Lehigh); K. R. Walker, Ph.D. Yale.

Assistant Professors:

D. W. Byerly, Ph.D. Tennessee; K. C. Misra, Ph.D. Western Ontario; W. P. Staub, Ph.D. Iowa State.

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours including at least 18 hours in courses (other than thesis) numbered above 5000. A minimum of 24 hours in geology courses, in addition to thesis, is required. Students who enter without having had an acceptable field camp are required to take Geology 4440, or an equivalent course elsewhere, as part of the above department requirements. One year of general physics is required (if student is undergraduate). Orientation examinations will be given to determine course program, which must be approved by the student's committee.

**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 a minimum of 45 hours in the 5000-6000 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.

2. One foreign language required (to be determined by the faculty committee). Preliminary examination will be both written and oral.

*3160 Introduction to Earth Materials (4) An introduction to the study of minerals, rocks and soils. Laboratory includes hand specimen and analytical methods of identification of important rock-forming and economic minerals and major rock and soil types. Prereq: Geology I. 2 lectures and 2 labs.

3180 Mineralogy (4) Classification and identification of silicate and non-silicate minerals. Minerals are phases in natural systems. Laboratory includes hand specimen, chemical and x-ray methods of identification. Prereq: 3160. 2 lectures and 2 labs.

*3210-20 Invertebrate Paleontology (4, 4) Systematic review of important invertebrate fossil groups. 3210—Protista to Brachiopoda, including sponges, coelenterates and bryozoa. 3220—Phoronida to Hemicheadata, including annelids, molluscs, arthropods and echniodes. May be taken separately or in any order. Prereq: Paleobiology, General Biology, 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 Paleobiology (4) An introduction to the principles and materials of paleobiology as applied to the earth's history. Prereq: Geoscience II, General Biology, or consent of instructor. 3 lectures and 1 lab or field period.

3270 Geological History of Land Organisms (4) The geological history and development of the terrestrial biota and ecosystem with special emphasis on the fossil record of land plants and vertebrates. Prereq: General Biology or consent of instructor. 3 lectures and 1 lab or field period.

3290 Physical and Biological Quaternary Environment of Humans (4) Interdisciplinary investigation of the historical and biological Quaternary environment with humanity, stressing important effects on landscapes and biota that interact with humans today. 2 lectures and 2 labs or field periods.

3310 Lithology (4) Classification and properties of igneous, metamorphic and sedimentary rocks. Laboratory includes both hand specimen and microscopic study of important rock types. Prereq: 3160. Strongly recommended: 3180. 2 lectures and 2 labs.

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

*3360 Stratigraphy-Sedimentation (4) An introductory study of stratigraphic principles and practices of sedimentary processes and the interpretation of depositional environments. Prereq: Geoscience II and 3160. 3 hrs and 1 lab or field period.

*3370 Structural Geology (4) Introductory discussion of structural features such as folds, faults, joint, cleavage and primary structures. Laboratory work includes depth and thickness problems, structural lineament, structure contour maps, etc. 3 hrs and 1 lab. Prereq: Elements of Geology (3) and Geometry and Calculus of a Single Variable (2 quarters) or equivalent.

*3410 Principles of Ground Water Geology (3) Geologic materials and processes affecting the occurrence and behavior of water. 2 lectures and 1 lab. (Same as Water Resources Development 3410.)

3510 Introductory Environmental Geology (4) Geologic problems involving earth environment and resources, and geologic parameters associated with their control and misuse. Prereq: Geoscience or consent of instructor. 2 lectures and 2 labs or field periods.

3520 Our Changing Landscapes (4) A basic introduction to the study of landscape-forming processes and their interactions with earth materials to produce landscapes. Laboratory experience includes slope and streamtable experiments and field experience. 2 hrs and 2 labs or field periods.

3610 Quaternary Geology for Engineers (3) Erosional and depositional processes, landforms, ground-water. 2 lectures and 1 lab or field period. Prereq: Introductory Geology for Engineers or equivalent.

3710 Origin and Evolution of the Continents and Ocean Basins (4) An introductory study of the origins of changes that have occurred in the earth's crust with emphasis on modern concepts of continental drift and plate tectonics. Prereq: Geoscience II.

4110 Principles of Economic Geology (4) Formation of mineral deposits. Prereq: 3160, 3370, or equivalent.

4115 Elementary Applied Geophysics (4) Basic principles of electrical, seismic, gravity and magnetic surveying. Prereq: Geoscience II and elementary physics. Differential and integral calculus desirable. 3 lectures and 1 lab.

4130 Sedimentology (4) Prereq: 3160. 2 hrs and 2 labs.

4210 Biostratigraphy (4) Fossil faunas and floras and their use in geochronology, stratigraphic correlation, and paleoecology. Prereq: 3260. 3 hrs and 1 lab.

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

4240 Paleobotany (Survey of fossil record of plants with particular emphasis on comparative morphological trends in major plant groups and chronological succession and geographic distribution of past floras on earth. Prereq: Geoscience II; Plants in evolution or consent of instructor. 3 hrs and 1 lab. (Same as Botany 4240.)

4310 Geologic Mapping (3) Interpretation and methods. Prereq: 12 hrs of Geology.

4370 Tectonic Styles (4) Elements, habitats, and geological causes of tectonic styles. Basic styles of tectonic deformation are presented on maps, sections, aerial photographs and fabric diagrams. 3 lectures and 1 seminar or lab. Prereq: 3370 or consent of instructor.

4440 Field Geology (5) Field weeks' field course, first term summer quarter. Employs entire time of students. A report is required, to be submitted no later than end of fall quarter. Prereq: 31 hrs of courses in geology and consent of instructor.

4460 Geologic Photography and Photogrammetry (4) An introduction to the 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 lectures and 2 labs and 1 lab. Prereq: 3390 or consent of instructor.

4510 Principles of Geomorphology (4) A study of the gravitational processes acting at the earth's surface and the landforms produced. Prereq: Elements of Geology (2 quarters) or consent of instructor. 3 hrs and 1 lab. (Same as Geography 4510.)

4510 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: General Chemistry or equivalent required. Recommended: Introduction to materials.

4650 Mineral Phase Equilibria (3) Principles of phase chemistry and application of phase equilibria studies in rock-forming mineral systems as applied to conditions of formation and modification of rocks. Prereq: 3310 or consent of instructor.

4660 Electron Microprobe Analysis: Theory and Application (3) Techniques and applicability of electron microprobe analysis: emphasis on applications in the earth sciences. Prereq: 3310 or consent of instructor. 2 lectures and 1 lab.

4760 Global Tectonics (3) The earth's gravity field, geomorphology and the internal structure of the earth; the geomagnetic field, paleomagnetism, radioactivity and the age of the earth; the earth's internal heat, creep and anelasticity of the mantle. 3 lectures per week. Prereq: 4115 or consent of instructor.

4810 Special Problems in Geology (1-4) May be repeated. Maximum 4 hrs.

5000 Thesis

5050 Geochemistry 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.

5060 Experimental Geochemistry (3) Study of various experimental techniques for investigating mineral phase equilibria at altered temperatures and pressures and an evaluation of the geochemical applicability of the derived data. Prereq: 5050 or consent of instructor.

5069 Experimental Geochemistry Laboratory (1-3) Independent lab study of a problem in geochemistry using lab techniques in 5060. Prereq: 5060 or consent of instructor.

5120 Geophysics—Gravity and Magnetic Methods (4) Potential methods discussed in depth, introduction to geodesy and paleomagnetism. Prereq: 5115 or consent of instructor. Advanced engineering mathematics desirable. 3 lectures and 1 lab.

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

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

5290 Quaternary Problems (4) An interdisciplinary approach to the interpretation of physical and biological phenomena directly or indirectly influenced by Pleistocene glaciation. Prereq: Elements of Geology (3 quarters) or consent of instructor. (Same as Botany 5290 and Zoology 5290.)

5310 Principles of Stratigraphy (4) Prereq: 4150.

5320-30 Advanced Historical Geology (3, 3) 5330-Geologic History of the Paleozone; 5330-Mesozoic and Cenozoic. Prereq: 5310.

5340 Seminar in Local Stratigraphy (1) Stratigraphy of the 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.

5360 Selected Topics in Geology (1) May be repeated for credit with consent of department.

5370 Mesofabric Analysis (4) Introduction to techniques of gathering, processing, and interpreting tectonic mesoscopic fabric data. 3 lectures and 1 lab or field meeting. Prereq: 3370.

5460 Photogeologic Interpretation (4) Advanced photogeologic techniques used to obtain geologic measurements from aerial photographs. Practice in photo interpretation of imagery covering selected geologic features. Prereq: 5450 or equivalent or consent of instructor.

5470 Platte Tectonics and Orogeny (4) Geometry and kinematics of plate motion are used to devise models of geosynclines, fold belts, metamorphic and plutonic belts, with recent and ancient examples. 3 lectures and 1 seminar or lab. Prereq: 3370.

5510 Optical Mineralogy (4) Identification of nonopaque substances by immersion methods, using petrographic microscope.

5520 Igneous Petrology (4) Description, classification and origin of igneous rocks. Laboratory emphasizes thin section study. Prereq: Lithology and 5510. 3 lectures and 1 lab.

5530 Metamorphic Petrology (4) A study of the physical and chemical characteristics of the metamorphic environment; its gradational nature with diageneis on one hand and igneous activity on the other. Laboratory consists of study of both hand specimens and thin sections and a field trip in the Blue Ridge province. Prereq: Mineralogy and 5510. 3 lectures and 1 lab.

5540 Non-carbonate Sedimentary Petrology and Basin Analysis (4) A study of clastic depositional environments, e.g., deep-water troughs, abyssal plain, continental shelf, intracratonic basin, and shoreline features. 3 hrs and 1 lab. Laboratory will consist of thin section studies of and field trips to representative ancient deposits. Prereq: 5510 or consent of instructor.

5550 Carbonate Sedimentology (4) Emphasis on environments of deposition of modern and ancient carbonates. Prereq: 4130 or consent of instructor; recommended: 5510, 3 lectures and 1 lab.

5560 X-Ray Diffraction and Spectroscopy (4) Production and use of x-rays in identifying crystalline substances; identification of chemical elements by their x-ray spectra. Prereq: 3160 or consent of instructor. 2 lectures and 2 labs.

5640 Clay Mineralogy (4) Origin of the clay minerals; their structures and properties; application of mineralogical techniques in clay mineral studies. Prereq: Mineralogy and 5630 or equivalent. 2 lectures and 2 labs. To be offered on alternate-year basis.

5650 Thermodynamics for Geologists (3) Principles of chemical thermodynamics as related to geologic processes. Prereq: General Chemistry and Analytic Geometry and Calculus of a Single Variable or equivalents.

5660 Chemical Geochemistry (3) Chemical approach to selected geologic problems. Topics of study include oxidation-reduction, phase equilibrium, chemical mineralogy. Prereq: 5650.

5670 Geochemical Prospecting (3) Theory and practice of geochemical prospecting for metallic ore deposits, i.e., the use of chemical analyses of rock, soil, plants, water, and stream sediment for locating ore. Prereq: 4110 and General Chemistry or equivalents.

5710 Advanced Paleontology (4) Fossil invertebrates.


5810 Geology of Fuels (4) Origin, occurrences, and uses of natural fuels.

5820 Metallic Mineral Deposits (4) Origin, occurrence, and uses of metallic minerals.

5830 Nonmetallic Mineral Deposits (4) Origin, occurrence, and uses of nonmetallic minerals. 3 hrs and 1 lab or field period.

5840 Ore Microscopy (4) The study of ores and ore minerals by reflected light microscopy, x-ray, and other techniques. Prereq: 4110, 5510, and consent of instructor. 2 hrs and 2 labs.

5850 Regional Studies in Economic Geology (3) Literature study and lectures during winter quarter, followed by field trip between winter and spring quarters to mining operations and other places of geological interest. Prereq: 4110 and consent of instructor. 2 hours plus field trip. May be repeated with consent of department.

5915 Regional Geomorphology (4) Study of selected geomorphologically-related areas which have common elements such as history or development, 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

6110-20-30 Seminar in Stratigraphic Geology (3, 3, 3)

6210-20-30 Seminar in Paleontology (3, 3, 3)

6310-20-30 Seminar in Structural Geology (3, 3, 3)

6410-20-30 Seminar in Mineralogy (3, 3, 3)

6510-20-30 Seminar in Petrology (3, 3, 3)
Germanic and Slavic Languages

MAJORS

German

M.A., M.A.C.T.

German Language and Literature

Ph.D.

Emeritus Professor:

E. T. Haukamer, Ph.D. (Bonn (Germany))

Professors:

H. Kretz (Head), Ph.D. Ohio State;
H. W. Fuller, Ph.D. Wisconsin; R. L. Hilfer, Ph.D. Cornell; N. L. W. Nordsieck, Ph.D. Ohio State; J. C. Osborn, Ph.D. Northwestern.

Associate Professors:

J. E. Fallen, Ph.D. Pennsylvania; D. E. Lee, Ph.D. Stanford; M. P. Rice, Ph.D. Vanderbilt.

Assistant Professors:

J. L. Elliott, Ph.D. Michigan; Donald M. Fienne, Ph.D. Indiana; H. A. Lauckner, Ph.D. Wisconsin; C. J. Mellor, Ph.D. Chicago.

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

MASTER OF ARTS PROGRAM

In addition to the general Graduate School requirements as stated on page 17, the department requires 36 quarter hours in approved courses, including at least 18 hours in courses numbered above 5000. In addition to course work, the student is required to write a thesis, for which he may get a maximum of nine hours credit. The minimum quarter hour credit for the M.A. is 45 quarter hours.

MASTER OF ARTS IN COLLEGE TEACHING PROGRAM

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

DOCTOR OF PHILOSOPHY PROGRAM

The student must fulfill the general requirements for the Ph.D. degree set by the Graduate School. The candidate for the Doctor's 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 pro-seminar (5200) and the literary or philological seminars (6210-20-30-40-50-60 and 6310-20-30). At least nine hours must be taken in a cognate field. Students are encouraged to take additional work in allied fields. A minor in an allied field must consist of at least 18 hours of 5000 or 6000 courses. Students must show a fluent command of German, both oral and written, and a knowledge of two other foreign languages, French and another language, such as Italian, Latin or Russian, appropriate to his 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 required to defend his dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

A 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.

German

3610-30-30 Elements of German for Upper Division and Graduate Students (3, 3, 3) For graduate students preparing for language examinations. No graduate credit allowed.

3620-30-30 German Language in English Translation (3, 3, 3) No foreign language credit.

3640 Old Norse Literature in English Translation (3-4) Prose readings of sagas of Norwegian kings, Icelandic family sagas, and Vindland sagas, narrating discovery of America around year 1000. Mythological and heroic poems of the Edda. No foreign language credit.

3650 Modern Scandinavian Literature in English Translation (3) Introduction to modern literature of Sweden, Norway, Denmark, and Iceland. Representative readings by such writers as Ibsen, Strindberg, Lagerlöf, Hamsun, Vesaas, Lagerkvist, Bang Nexo, Laxness. No foreign language credit.

4650 The Faust Legend (3) Survey of development of legend from Faust chapbook to present, excluding Goethe's Faust. No foreign language credit.

4610-20-30 Studies in Classical and Modern Writers (3, 3, 3) Content varies. May be repeated for credit. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30) or equivalent.

4640-50 Selected Topics in German Literature from 1750 to the Present (3, 3) Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30) or equivalent.

4660 Studies in German Authors (3) Study of the life and works of a single outstanding German literary figure. Content varies. May be repeated for credit. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30).

4670 Theatrical German (1-3) Performance in one or more German plays. May be repeated for credit with consent of department. Prereq: Intermediate German or equivalent or consent of instructor.

4620-20-30 Studies in German Literary Types (3, 3, 3) 4210—Narrative Prose. 4220—Drama. 4230—Lyric Poetry. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30) or equivalent.

4650 Introduction to Descriptive Linguistics (3) (Same as French 4620.)

4680 Introduction to Historical and Comparative Linguistics (3) Linguistic change, proto-languages. Phonological and morphological change. Cultural, historical, sociological influences upon the development of language. Semantic change. Lexicography. All these topics copiously illustrated by selected examples from Indo-European languages. Prereq: 9 hours of upper division English, or 9 hours of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30, courses in literature in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as French, Russian, and Spanish 4620.)

4670 Introduction to Germanic Linguistics (3) The phonetics and phonemics of German, German grammar and the German vocabulary from the oldest language to the present. The dialects of German. An introduction to the study of the other Germanic Languages.

4631-20 History of the German Language (3, 3)

4680-20-30 Advanced Conversation and Composition (3, 3, 3) Prereq: 3810-20-30 or equivalent or consent of department.

5000 Thesis

5100 German Phonetics and Advanced Grammar (3)

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 137.

5103 Independent Study (1-12) See page 138.

5160 Introduction to German Semantics (3)

5200 Proseminar (3) Bibliography; methods; illustrative problems; preparation of papers.

5210-20-30 College Teaching of German (1, 1, 1) Required of all M.A., M.A.C.T., or Ph.D. candidates, except those whose previous teaching experience warrants excuse from this requirement or who wish to pursue vocations other than teaching.

5410-20-30 Medieval German Language and Literature (3, 3, 3) 5410—Introduction to Middle High German; 5420-30—Readings in Medieval German Literature.

5500 Studies in German Literature (3) Content varies. May be repeated. Maximum 9 hrs.

5510 German Humanism and the Reformation (3)

5520 German Baroque Literature (3)

5530 The Enlightenment and the Rococo (3)

5540 German Classicism (3)

5550 Goethe's Faust (3)

5560 German Romanticism (3)

5570 German Realism and Naturalism (3)

5580 Modern German Literature (1889-1945) (3)

5590 Modern German Literature (1945-Present) (3)

5600 German Literary Theory and Criticism (3)

5610-20-30 Directed Readings in German Language and Literature (3, 3, 3) 5610-20-30-40-50-60 Directed Readings in German Language and Literature (3, 3, 3, 3, 3, 3)

5620 German Literary Theory and Criticism (3) Linguistic change, proto-languages. Phonological and morphological change. Cultural, historical, sociological influences upon the development of language. Semantic change. Lexicography. All these topics copiously illustrated by selected examples from Indo-European languages. Prereq: 9 hours of upper division English, or 9 hours of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30, courses in literature in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as French, Russian, and Spanish 4620.)

5630 Introduction to Modern German Linguistics (3) Introduction to modern Germanic Linguistics (3) Linguistic change, proto-languages. Phonological and morphological change. Cultural, historical, sociological influences upon the development of language. Semantic change. Lexicography. All these topics copiously illustrated by selected examples from Indo-European languages. Prereq: 9 hours of upper division English, or 9 hours of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30, courses in literature in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as French, Russian, and Spanish 4620.)
5720 Readings in Old Norse Prose (3) Intensive readings of Old Norse prose works. The study of the Icelandic saga as a literary genre.

5730 Readings in Old Norse Poetry (3) Intensive reading of the Edda poems. Study of these poems as a literary genre and as a repository of ancient Germanic customs, legends, and mythology.

6000 Doctoral Research and Dissertation

6100 Greek (3) Phonology, morphology, and syntax of the Greek language. Its relationship to Indo-European and other Germanic languages. Readings from the Greek Bible.

6120-30 Old High German (3, 3, 3) 6120—Introduction: the phonology, morphology, and syntax of the Old High German of the 8th and 9th centuries. Dialects. Representative prose readings. 6130—Literature and Linguistics; intensive study of the prose and poetry of the period from linguistic and literary points of view. The development of the language in the Old High German period.

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

6210-20-30-40-50-60 Seminar in German Literature (3, 3, 3, 3, 3) May be repeated.

6310-20-30 Germanic Philology (3, 3, 3) May be repeated.

6320-20-30-40-50-60 Seminar in English Translation (3, 3, 3, 3, 3) 6320—Russian translation and readings. 6321—German translation and readings. 6330—French translation and readings.

6420-21-10 Seminar in Russian Literature in English Translation (3, 3, 3, 3) 6400—Russian literature in English translation. 6410—Russian literature in English translation. 6420—Russian literature in English translation.

4250 Introduction to Descriptive Linguistics (3) (Same as French 4250.)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German 4260.)

4270 Introduction to Slavic Linguistics (3)

4310-20-30 Advanced Studies in Russian Language (3, 3, 3) Intended primarily for students majoring in Russian who are interested in language and linguistics. Includes problems in morphology and syntax, stylistics and translation techniques, and history of Russian language as well as other special problems for advanced students of Russian.

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

Greek
See Classics

History

MAJOR DEGREES

History

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

Professors:

P. H. Bergeron, Ph.D.; D. D. Vanderbilt; J. D. Bingham, Ph.D.; Indiana; D. D. Marylands; G. D. M. Perry, Ph.D.; Harvard;

J. D. R. Encunck, Ph.D. (Bakley); J. J. R. Finger, Ph.D. Washington; C. W. Johnson, Ph.D.; Michigan; D. M. M. M. A., Ph.D.; Harvard;

C. M. McDonald, Ph.D.; Pennsylvania;

J. D. Muldowny, Ph.D. Yale; J. J. Pinckney, Ph.D.; Vanderbilt; E. T. Honda, Ph.D.; Emory;

W. B. Wheeler, Ph.D. Virginia.

Assistant Professors:

S. D. Becker, Ph.D.; Case-Western Reserve;

S. B. Blanshei, Ph.D.; Bryn Mawr;

H. D. Holmes, Ph.D.; Missouri; J. D. Morrow, Ph.D.; Pennsylvania;

B. D. R. Rice, Ph.D.; Harvard;

J. D. Getty, Ph.D. Illinois.

M A S T E R S PROGRAM

Master of Arts—Plan I: Course requirements include History 5240, and either 5250 or 5260; one M.A. reading course; at least six additional hours above 5300. Total hours, including thesis—45. Plan II: History 5240, and either 5250 or 5260; two M.A. reading courses; 12 additional hours above 5300; at least 2 of which must be above 6300. Total hours—45. Plan II requires 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, 5271-73-73, and Cont. and High. Ed. 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 M.A.C.T. degree may substitute nine quarter hours of courses numbered above 6300 for the Master's thesis.

DOCTORAL PROGRAM

1. Admission: (a) Acceptable scores on the Graduate Record Examination (General Aptitude and History Achievement). (b) Students successfully completing the M.A. degree at The University of Tennessee must be recommended by the Department of History.

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

2. Residence and Course Work: Beyond the Bachelor's degree a minimum of 75 credit hours in course work is required, of which not less than 45 must be in courses that are numbered above 5000. Not less than six quarters of the required nine 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 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 additional research tools, such as statistics, which it regards as essential for the student's preparation.

The 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 should consult with his advisor. The appropriate forms and the time of the examination may be obtained from the Graduate School.

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

4. 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); two minor fields (History); and one minor field which may be either in History or outside the department. In any case, the student is required to have nine 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, 1095-1150

II. Early Modern

(1) Renaissance and Reformation

(2) Europe, 1515-1819
Second Reich, 1713-1890. 3730—From a united to a divided Germany, 1890 to present. 3750-50-70 Ancient History (3, 3, 3) 3750—Ancient Near East. 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 16th Century to World War I. 3795 Contemporary Middle East (4) Background of current problems in the area, from World War I to present. 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 1920's. 3830—Contemporary China, Japan and Korea, 1920's to present. 3870-80-90 History of Latin America (3, 3, 3) 3870—Exploitation, 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. 3910-21-31 United States, 1877 to the Present (3, 4, 3) 3911—Gilded Age and Progressive Era, 1877-1917. 3921—WW I, New Deal, WW II, 1914-1945. 3930—1945 to 1970. 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 19th century. 4130—19th century to present. 4250-60-70 European Intellectual and Cultural History (3, 3, 3) 4250—From the Scientific Revolution (1500-1700). 4260—From the Enlightenment to the Age of Revolution (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 of family as well as relationships between Western women and women's protest movements. 4290 Women in American History (4) Approaches of 4280 applied to American Society. 4311-21 History of American Foreign Relations (4, 4) 4311—Revolution to 1912. 4321—1912 to present. 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 involved in our wars, and relationship between American society and its armed forces. 4380—Civilian-Military Relationships in the Modern Western World (3) Civilian-military affairs from about 1900 to 1960 in Western Europe, Asia, and America; emphasis on Western Europe: e.g. the Dreyfus Affair, the Army in Nazi Germany, and the Truman-MacArthur controversy. 4410-20-30 Europe Since 1914 (3, 3, 3) 4410—Pre-war European social politics and politics to the World Depression. 4420—The World Depression to the end of World War II. 4430—Postwar Europe. 4470 Poland and Its Neighbors (3) A survey of Polish history from its beginnings to the present with some emphasis on the Polish question and its context with the modern international affairs. 4480 Russian Intellectual History (3) A survey of Russian intellectual history from the eighteenth century to the present, emphasizing the problems of Westernization, nationalism, and the revolutionary tradition. 4490 Soviet Foreign Policy (3) 4500 History of Medieval England (3) 4510-20 Tudor-Stuart England (3, 3) 4510—1547-1603. 4520—1603-1714. 4551 Great Britain from Burke to Burke (1780-1848) (3) 4570 Twentieth Century Britain (3) 4580 Revolution & Reform: Ireland in the 19th and 20th Centuries (4) 4590 History of Canada, 1774-Present (3) 4610-20-30 The American Frontier and Westward Movement I, II, III (3, 3) 4610—1607 to 1754. 4620—The American Colonies and the American Revolution (3, 3) 4620—1754-1789. 4630-40-50 The United States: Formation to 1754. 3620—1754-1789. 4670 American Urban History (4) 4710-20-30 Medieval History, 500-1400 (3, 3, 3) 4710—Early Medieval period to Revolution of Empire in 962. 4720—962 to Renaissance of 12th century to Renaissance of 12th century to Italian Renaissance. 4740 The City in Europe, ca. 1200-1900 (3) European urban growth, with comparative analysis of the major periods of urbanization of the 13th and 19th centuries. Emphasis on the relationship between the demographic, economic and social foundations of the cities and political and cultural developments. 4770-80 Austria and Central Europe (3, 3) 4770—To 1917. 4780—Since 1917. 4811-21 History of Japan (4, 4) 4840 History of Mexico (3) 4850 History of the Caribbean (3) The Caribbean region from discovery and colonization to contemporary times. 4870-80-90 China (3, 3, 3) 4870—Cultural History of modern China. 4890—History of contemporary China. 4910-20-30 History of the South (3, 3, 3) 4910—1607-1840. 4920—1840-1870. 4930—Since 1870. 4950-60 The Negro in American History (3, 3) A history of the American Negro since 1619. 5000 Thesis 5101 Foreign Study (1-12) See page 137. 5102 Off-Campus Study (1-12) See page 137. 5103 Independent Study (1-12) See page 138. 5211-5225 M.A. Reading Courses (3 hrs each) Directed reading courses in preparation for fields required for the Master's oral examination. 5211, Ancient; 5212, Medieval; 5213, Early Modern Europe; 5214, Europe Since 1789; 5215, American History to 1815; 5216, American History Since 1789; 5217, Latin America; 5218, Far East; 5219, Colonialism and Imperialism; 5240, Imperial Japan; 5252, Russia; 5253, Germany; 5224, France; 5225, Middle East. 5/N/SC only. Open only to master's candidates in history. 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 the leading European nations.

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<td>5271-72-73</td>
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<td>5280</td>
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<tr>
<td>5690</td>
<td>Topics in 20th Century American History (3)</td>
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5910-20 Topics in Southern History (3, 3) 5910 —The Old South. 5920—The New South.

6000 Doctoral Research and Dissertation

6210-20-30-40 Directed Readings (3, 3, 3, 3) | Individual readings directed toward preparation for preliminary examination fields. Open only to candidates for the Ph.D. degree who are in residence and who have been in residence at least two quarters. Only one course may be taken in preparation for each of the four fields. Depending on the field in which he is reading, the student will be assigned to an appropriate member of the department. S/NC only. |

6300 Seminar in In Special Studies (3) |
| 6310 | Seminar in Tennessee History (3) |
| 6350 | Seminar in American Diplomatic History (3) |
| 6410-20 | Seminar in Western Europe (3, 3) |
| 6444 | Seminar in French History (3) |
| 6480 | Seminar in Russian History (3) |
| 6510 | Seminar in English History (3) |
| 6610 | Seminar in American Colonial History (3) |
| 6620 | Seminar in the Era of the American Revolution (3) |
| 6630 | Seminar in Early National Period of American History (3) |
| 6635 | Seminar in Jacksonian Period (3) |
| 6640 | Seminar in Social and Cultural History of the United States (3) |
| 6650 | Seminar in the American Westward Movement (3) |
| 6710 | Seminar in Medieval Institutions (3) |
| 6740 | Seminar in the Crusades (3) |
| 6770 | Seminar in Central European History (3) |
| 6810 | Seminar in Latin American History (3) |
| 6910 | Seminar in the Civil War Era (3) |
| 6930 | Seminar in Twentieth-Century America (3) |
| 6940 | Seminar in the History of the South (3) |
| 6960 | Seminar in Negro History (3) |

Registration in topics and seminar courses may be repeated for credit with the permission of the department.

Latin

See Classics

Mathematics

MAJOR DEGREES
Mathematics

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

Professors:

- L. K. Barrett (Head), Ph.D. Pennsylvania;
- G. E. Albert (Emeritus), Ph.D. Wisconsin;
- V. S. Bradley, Ph.D. Iowa; R. E. Cline, Ph.D. Purdue; D. J. Dessart, Ph.D. Maryland; E. D. Eaves (Emeritus), Ph.D. Texas; H. Francaen, Ph.D. Illinois; D. A. Gardner, Ph.D. North Carolina State; R. T. Gregory, Ph.D. Illinois; B. R. Hinton, Ph.D. Tennessee;
- A. S. Householder (Emeritus), Ph.D. Chicago;
- L. H. Husch, Ph.D. Florida State;
- R. M. McConnell, Ph.D. Duke; H. T. Mathews, Ph.D. Tulane; D. D. Miller, Ph.D. Michigan;

* Space Institute, Tullahoma.

Ph.D. Indian Institute of Technology (India); F. W. Stellmann, Ph.D. Giessen (Germany).

Associate Professors:

- A. Berman, Ph.D. Northwestern;
- J. H. Carruth, Ph.D. Louisiana State; C. E. W. Evans, Ph.D. Pennsylvania State; R. D. Davison, Ph.D. Wisconsin; D. E. Dobbs, Ph.D. Cornell;
- W. E. B. Du Bois, Ph.D. New York (Binghampton);
- J. W. Heidel, Ph.D. Iowa; R. A. Kimball,* Ph.D. Ohio State; G. A. Klausen, Ph.D. Nebraska; Y. Kuh, Ph.D. Cincinnati;
- H. L. Lee (Emeritus), Ph.D. Duke;
- L. H. Turner, Ph.D. Purdue; W. R. Wade, Ph.D. California (Riverside); C. G. Wagner, Ph.D. Duke.

Assistant Professors:

- W. Brandal, Ph.D. Northwestern; E. L. Evans, Ph.D. Houston; J. F. Hall, Ph.D. Rice; G. S. Jordan, Ph.D. Wisconsin; W. F. Keigher, Ph.D. Illinois at Urbana-Champaign; J. E. Leech, Ph.D. California (Los Angeles); N. W. Leggett, Ph.D. Kentucky; R. Lowery, Ph.D. Calif. Inst. Tech; D. R. Peterson, Ph.D. Michigan State;
- W. E. Row Jr., Ph.D. Virginia; J. R. Rowell, Ph.D. Virginia; S. M. Sarbin, Ph.D. Cornell;
- C. C. Travis, Ph.D. Calif. (Davis); A. M. Wang, Ph.D. Minnesota;
- R. D. Weidner, Ph.D. California (Berkeley).

Math

3050, 3060, 3090, 3100, 3110, 3120, 3130, 3230, 3420, 3310, 3510-20-30, 3720, and 3910 are intended primarily for students preparing to teach in elementary or secondary schools.

Any 3000 or 4000 course in the department whose course number ends in "0" may be offered as an honors version. In this case, the last digit will appear as an "h" and the title will be preceded by the word "Honors" both in the Timetable and on the student's transcript. Honors versions of courses listed in the Graduate Catalog are acceptable for graduate credit. Such courses may be offered upon the initiative of interested faculty, students, or the department head (though in all cases subject to the approval of the department head).

MASTER 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 have either (a) certification for teaching secondary mathematics in at least one of the states of the United States, or (b) three years of successful elementary or secondary school teaching experience. Evidence of the requirement being met must be supplied by the student.

Applicants for admission to this program must take the Graduate Record Examination (aptitude portion), and have had at least one year of college mathematics including analytic geometry.

The following requirements must be met:

1. Completion of 45 hours of course work. A minimum of 30 hours must be taken in residence.

2. A minimum of 36 hours must be selected from the mathematics courses 3330, 3360, 3370, 3110, 3120, 3130, 3150, 3155, 3230, 3240, 3310, 3510, 3520, 3530, 3710, 3720, 3810, 3910, or other mathematics courses numbered above 4000.

3. Passing a comprehensive examina-
tion on completion of all course work. (4) A minimum of nine hours of courses numbered above 5000 subject to the approval of the mathematics department and the department in which the courses are taken.

MASTER'S PROGRAM

The Master of Arts degree and the Master of Science degree are designed primarily for prospective high school or college teachers and also for people interested in applied mathematics.

The departmental requirement for either of these degrees is a thesis, for which nine credit hours must be earned, and 36 additional hours of acceptable course work numbered above 4000. Of the above 36 hours, nine hours may be in a minor outside the department and 18 hours (exclusive of thesis) must be completed from courses in mathematics numbered above 5000.

It is strongly recommended that a candidate for the Master's degree with a major in mathematics develop a reading knowledge of French, German, or Russian.

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

DOCTORAL PROGRAM

The preliminary examination for the Ph.D. degree in mathematics will include four of the following subjects (including at least two from Group A) to the extent indicated by the accompanying course numbers, and such other subjects as the graduate faculty may prescribe.

(A) Algebra 5510-20-30
Functions of a Complex Variable 5110-20-30
Functions of a Real Variable 5210-20-30
Toplogy 5910-20-30
(B) Linear Analysis 5240-50-60
Mathematical Statistics 5750-60-70
Numerical Analysis 5650-60
Partial Differential Equations 5450-60-70

Note: A student selecting two subjects from Group B above is required to take a one year graduate level (numbered 5000 or above) course, where mathematics is extensively used, outside of the Mathematics Department. This course must be approved by the Mathematics Department Head.

It is expected that the candidate will participate in courses and seminars in mathematics and related fields beyond those required to qualify for the preliminary examination. The amount and nature of this work will be determined by the candidate's advisory committee.

Two foreign languages are required. German or French 3300 with a grade of A or B may be substituted for the corresponding language 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; conditional probability; independence; axiomatic probability theory; random variables and their distributions; simple random processes. Prerequisites: Calculus, General Mathematics 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. Prerequisites: 3050 or consent of instructor.

3090 Polynomials and Rings (3) Elementary introduction to modern abstract algebra. Axiomatic approach is used to study divisibility and factorization in rings of integers and of polynomials with coefficients from various fields. Prerequisites: Multivariable Calculus and Matrix Algebra or consent of instructor.

*3100 Logic and Sets (3) Elements of mathematical logic; truth sets and open sentences; diagrams for truth sets; elementary algebra of sets with operations on sets; intersection, union, and complement. Prerequisite: 1 year of college math. Primarily for students in the College of Education.

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

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

3155 Introduction to Numerical Algorithms (3) (Same as Computer Science 3150.)

3220 History of Mathematics (3) Survey of development of various branches of mathematics, from ancient to modern times. Prerequisite: Single Variable Calculus or Calculus or equivalent.

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

3320 Non-Euclidean Geometry (3) Foundations of geometry. Elliptic and hyperbolic plane geometry. Prerequisite: 1 year of college math.

3330 Transformational Geometry (3) Fundamental transformations in Euclidean Geometry. Classification of isometries and similarities; symmetries of a polygon; inversions. Prerequisite: 1 year of college math.

3510 Intermediate Analysis (3) Primarily for students in secondary mathematics education. Course covers elementary calculus from advanced viewpoint with emphasis on proofs of basic theorems. Topics covered include limits of sequences and functions, continuous functions, derivatives, definite integral, and fundamental theorem of integral calculus. Prerequisite: Calculus of Algebraic Functions, Linear Algebra and Calculus or Single Variable Calculus.


3780-90 Introduction to Combinatorial Theory (3, 3) Introduction to problems of arrangement and selection within discrete systems. Enumeration by recurrence relations and generating functions, graph theory, finite geometries and finite fields, partitions, block designs. Prerequisites: Multivariable Calculus and Matrix Algebra or consent of instructor.

3810 How to Prove It (3) Course is designed to improve understanding of methods of mathematical proofs by means of practice and participation in seminar setting. Variable content but will include certain standard topics such as set theory, relations and functions, and mathematical induction. Corequisite: Multivariable Calculus and Matrix Algebra or Calculus.

3920-30 Topology of Euclidean Spaces (4, 4) Topics will include algebra, topology, plane and solid separation properties, compactness, connectedness, completeness, continuous functions, homeomorphisms, continua, and topological invariants. Must be taken in sequence. Prerequisites: Multivariable Calculus and Matrix Algebra and 3810, or Honors: Multivariable Calculus and Linear Algebra.

3990 Studies in Mathematics (1-4) Credit determined at end of semester. Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

4035-45 Introduction to Numerical Linear Algebra (3, 3) (Same as Computer Science 4035-45.)

4050 Matrix Algebra and Applications (3) Matrices, linear equations, vector spaces, determinants, eigenvalues and eigenvectors. Prerequisites: Multivariable Calculus and Matrix Algebra or Calculus.

4060-70 Matrix Algebra and Applications (3, 3) Eigenvectors and eigenvectors, singular values and singular vectors, unitary and similarity transformations, quadratic forms, vector and matrix norms, inner product, orthonormal form, and related topics. Prerequisites: Multivariable Calculus and Matrix Algebra or 4050.

4120 Linear Algebra (3) Abstract vector spaces, linear transformations, and their matrices, systems of linear equations and determinants, inner products, and diagonalization of symmetric matrices. Prerequisites: Multivariable Calculus and Matrix Algebra or 4050.

4150-60 Abstract Algebra (3, 3) Equivalence relations, factoring polynomials of Integers, elementary theory of groups of rings, polynomial rings, integral domains, divisibility, unique factorization domains, fields. Must be taken in sequence. Prerequisites: Multivariable Calculus and Matrix Algebra or 4050.

4225-35 Introduction to Numerical Analysis (3, 3) Interpolation and approximation, numerical differentiation and integration, roots of equations, transcendental and nonlinear equations. Prerequisites: 3150 or 3155. (Same as Computer Science 4225-35.)

4230 Intermediate Numerical Methods (3) Numerical methods in differential and algebraic equations: linear systems of equations and other topics in numerical mathematics. Emphasis on application of computers. Must be taken in sequence. Prerequisites: 3150 or 3155.

4250 Elementary Complex Variables (3) Complex numbers, Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula, Taylor and Laurent series, residues and contours. Prerequisites: Multivariable Calculus and Matrix Algebra; one 4000-level mathematics course recommended.

4510-20-30 Introduction to Analysis (3, 3, 3) Real number system, functions, sequences, limits, continuity, differentiation, integration. Functions of several variables, implicit function theorem. Multiple integrals, infinite series, sequences and series
5450 Infinite Series and Functions of Several Variables (3) General theory, power series and Taylor's formula. Partial differentiation and maxima and minima for functions of several variables. LeGrange multipliers. Prereq: Multivariable Calculus and Matrix Algebra.

4550 Partial Differential Equations (3) Fourier series; Fourier integrals; orthogonal functions; the vibrating string; solution by series; heat flow, Bell equations. Prereq: Multivariable Calculus or Matrix Algebra.


5550 Finite Difference Methods for Partial Differential Equations (3) Finite difference techniques for the solution of parabolic, elliptic, and hyperbolic equations. Computer implementation, stability, consistency and convergence, nonlinear problems; curve boundaries; solution of linear systems. Prereq: 4520 or 4550 and 4550. (Same as Computer Science 4550.)

5455 Mathematical Aspects of the Finite Element Method (3) Implementation of the Ritz-Galerkin methods for ordinary differential and partial differential equations. Local bases, approximation theory, rates of convergence, eigenvalues and eigenvectors, finite elements, hybrid elements. Prereq: 3150 or 3155 and 4550. (Same as Computer Science 5465.)

5500 Lattice Theory (3) Partly ordered sets,

5520-30-40 Theory of Matrices (3, 3, 3) The algebra of matrices; the characteristic equation; the Cayley-Hamilton theorem; solution of linear equations; congruence of matrices; similarity of matrices; group theory. Prereq: 4510-20-30.

5530-60-70 Advanced Mathematical Statistics (3, 3, 3) Treatment of advanced statistical techniques. Prereq: 5520 or consent of instructor.

5540 Galois Theory (3) Fields and their extensions, separable and non-separable 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, 3) Study of matrix theory, vector norms, eigenvalues, and eigenvectors, and applications of the above in the solution of systems of linear algebraic equations. Prereq: 3000, 3009, and one year of physics.

5610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) Theory of ordinary differential equations from an advanced viewpoint. Topics may vary from year to year. Prereq: 5510-20-30 and 5110-20-30 or consent of instructor.

5620-30-40 Partial Differential Equations I (3, 3, 3) Introduction to partial differential equations. Prereq or coreq: 4510-60 and 5210-20-30 or consent of instructor.

5630-40-50 Theory of Semigroups (3, 3, 3) Congruences and homomorphisms; ideals, subsemigroups, maximal ideals, prime ideals, quotient rings. Prereq or coreq: 5520.

5670-80 Theory of Groups (3, 3, 3) Structure of finite groups, free groups, nilpotent and solvable groups, and their extensions and products. Prereq: 5510.

5690 Group Representations (3) Representations of groups; matrix representations; group characters. Prereq: 5510.

5691 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5692 Seminar Topology (3) Seminar in topology. Prereq or coreq: 5510.

5693 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5694 Seminar Foundations (3) Seminar in foundations of algebra and topology. Prereq or coreq: 5510.

5695 Seminar Applied Mathematics (3) Seminar in applied mathematics. Prereq or coreq: 5510.

5910-20-30 Elementary Topology (3, 3, 3) For 5820. Prereq or coreq: 5510.

5920 Seminar Research in Mathematics (1-3) Open to graduate students with permission of the department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

5991 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5992 Seminar Topology (3) Seminar in topology. Prereq or coreq: 5510.

5993 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5994 Seminar Foundations (3) Seminar in foundations of algebra and topology. Prereq or coreq: 5510.

5995 Seminar Applied Mathematics (3) Seminar in applied mathematics. Prereq or coreq: 5510.

6000 Doctoral Research and Dissertation 6210-20-30 Linear Analysis (3, 3, 3) Algebraic and topological properties of linear spaces, emphasis on normed spaces; linear functionals and dual spaces; linear transformations; special topics (spectral theory, ergodic theory, semigroups of transformations); applications to problems in analysis. Prereq: 4150-60 and 5210-20-30. Must be taken in sequence.

6450-60-70 Partial Differential Equations II (3, 3, 3) Advanced topics in classical and modern theoretical partial differential equations. Prereq or coreq: 4510-60 and 5210-20-30 or consent of instructor.

6510-20-30 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: 5510-20-30.

6610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) Theory of ordinary differential equations from an advanced viewpoint. Topics may vary from year to year. Prereq: 5510-20-30 and 5110-20-30 or consent of instructor.

6810-20-30 Topological Algebra (3, 3, 3) Topics chosen from topological semigroups, topological groups, Lie groups; transformation groups; topological lattices; relations in topological spaces; topological rings, fields, algebras. Prereq or coreq: 5910-20-30.

6910-20-30 Modern Topology (3, 3, 3) This course provides technical background to read and contribute to current literature in topology. Topics vary from year to year.

7840-50-60 Introduction to Algebraic Topology (3, 3, 3) Introduction to homology, cohomology, and homotopy theories. Typical topics discussed will be homology and cohomology groups, the Eilenberg-Steenrod axioms, cup and cap products, duality theorems, homotopy equivalence, higher homotopy groups, fiber spaces, spectral sequences. Prereq: 4150 and 5920.

6991 Seminar Analysis (3) Seminar in analysis. Prereq or coreq: 5920.

6992 Seminar Topology (3) Seminar in topology. Prereq or coreq: 5920.

6993 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5920.

6994 Seminar Foundations (3) Seminar in foundations of algebra and topology. Prereq or coreq: 5920.

6995 Seminar Applied Mathematics (3) Seminar in applied mathematics. Prereq or coreq: 5920.

5920 Seminar Research in Mathematics (1-3) Open to graduate students with permission of the department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

5991 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5992 Seminar Topology (3) Seminar in topology. Prereq or coreq: 5510.

5993 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5994 Seminar Foundations (3) Seminar in foundations of algebra and topology. Prereq or coreq: 5510.

5995 Seminar Applied Mathematics (3) Seminar in applied mathematics. Prereq or coreq: 5510.

6000 Doctoral Research and Dissertation 6210-20-30 Linear Analysis (3, 3, 3) Algebraic and topological properties of linear spaces, emphasis on normed spaces; linear functionals and dual spaces; linear transformations; special topics (spectral theory, ergodic theory, semigroups of transformations); applications to problems in analysis. Prereq: 4150-60 and 5210-20-30. Must be taken in sequence.

6450-60-70 Partial Differential Equations II (3, 3, 3) Advanced topics in classical and modern theoretical partial differential equations. Prereq or coreq: 4510-60 and 5210-20-30 or consent of instructor.

6510-20-30 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: 5510-20-30.

6610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) Theory of ordinary differential equations from an advanced viewpoint. Topics may vary from year to year. Prereq: 5510-20-30 and 5110-20-30 or consent of instructor.


6810-20-30 Topological Algebra (3, 3, 3) Topics chosen from topological semigroups, topological groups, Lie groups; transformation groups; topological lattices; relations in topological spaces; topological rings, fields, algebras. Prereq or coreq: 5910-20-30.

6910-20-30 Modern Topology (3, 3, 3) This course provides technical background to read and contribute to current literature in topology. Topics vary from year to year.

6940-50-60 Introduction to Algebraic Topology (3, 3, 3) Introduction to homology, cohomology, and homotopy theories. Typical topics discussed will be homology and cohomology groups, the Eilenberg-Steenrod axioms, cup and cap products, duality theorems, homotopy equivalence, higher homotopy groups, fiber spaces, spectral sequences. Prereq: 4150 and 5920.

6991 Seminar Analysis (3) Seminar in analysis. Prereq or coreq: 5920.

6992 Seminar Topology (3) Seminar in topology. Prereq or coreq: 5920.

6993 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5920.

6994 Seminar Foundations (3) Seminar in foundations of algebra and topology. Prereq or coreq: 5920.

6995 Seminar Applied Mathematics (3) Seminar in applied mathematics. Prereq or coreq: 5920.

5920 Seminar Research in Mathematics (1-3) Open to graduate students with permission of the department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

5991 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5992 Seminar Topology (3) Seminar in topology. Prereq or coreq: 5510.

5993 Seminar Algebra (3) Seminar in algebra. Prereq or coreq: 5520.

5994 Seminar Foundations (3) Seminar in foundations of algebra and topology. Prereq or coreq: 5510.

5995 Seminar Applied Mathematics (3) Seminar in applied mathematics. Prereq or coreq: 5510.
5412 Bacterial Physiology Laboratory (2) Pre-req or coreq: 4111.

5430 Taxonomy of Bacteria (3) Bacterial classification. Pre-req: 3000, 3009.

5421 Virology (3) The spectrum of bacterial, animal and plant viruses is presented with special emphasis on the characteristics of infectious cycles and the molecular concepts of replication. Pre-req: 3000, 3009. Biochemistry 4110-20 or consent of instructor.

5452 Virology Laboratory (2) Laboratory procedures for the isolation, handling and culturing of both animal and bacterial viruses. Methodology for the conduct of molecular studies of virus replication is presented. Pre-req or coreq: 4521.


4819 Bacterial and Viral Genetics Laboratory (2) Laboratory exercises designed to accompany 4811. Coreq: 4811, or pre-req: General Genetics.

4820 Medical Mycology (3) Disease-causing fungi: cytology, physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq: 3000, 3009, and 3820 or consent of instructor.

4829 Medical Mycology Laboratory (2) Pre-req or coreq: 4820.

5000 Thesis

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

5130 Topics in Taxonomy (3) Isolation, cultivation and taxonomic relationships of schizomycetes, with emphasis upon the less frequently encountered orders. Prereq: 4110, 3 labs.

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

5360 Topics in Immunology and Immunchemistry (4) Molecular and genetic aspects of immunoglobulin synthesis. Theoretical and practical exercises in immunchemistry. Pre-req: 3071, 3072, Biochemistry 4110-20 or equivalent.

5400 Seminar in Microbial Physiology (1) Readings and discussions based on the current literature. May be repeated. S/NC only.

5410 Seminar in Immunology (1) Readings and discussions based on the current literature. May be repeated. S/NC only.

5411-42-43-44-45-46 Clinical Microbiology (6, 6, 6, 6, 6, 6) Weekly, six-quarter hours each, consisting of lectures and clinical laboratory experience. Enrollment by permission of the department head.

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

5720 Microbial Physiology (3) Lectures and seminars dealing with current advances in bacterial physiology including growth and cell structure. Pre-req: 4111; Biochemistry 4110-20.

5730 Pathogenesis of Infectious Disease (3) Host response to infection. Derangement of host-metabolism stimulated by microbial invasion, exotoxins, endotoxins and other factors related to virulence. Alteration of genetic and hormonal controls resulting from progressive infection. Pre-req: 3071.

5750 The Oncogenic Viruses (3) Lectures and special laboratory exercises dealing with known tumor-inducing viruses. Prereq: 4521 or consent of instructor. 2 hrs and 1 lab.

5760 The Bacterial Viruses (3) Lectures and discussions dealing with bacterial viruses with emphasis on the biological and chemical consequences of bacteriophage infection. Text will be supplemented by readings from the literature. Prereq: 4521; Biochemistry 4110-20.

5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetic concepts (mutation, recombination, selection) at the molecular level. Emphasis on studies of the lactose operon of Escherichia coli. Prereq: 4811 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: 3510; Biochemistry 4110-20. Recommended: Food Technology 4920.

5830 Seminar in Microbial Pathogenesis (1) Readings and discussions based on the current literature. May be repeated. S/NC only.

5850 Seminar in History of Microbiology (1) Studies concerned with microbiologists and their achievements from Pasteur to the present. S/NC only.

6180-20-30 General Seminar (1, 1, 1) Reviews of current literature. May be repeated. S/NC only.

6940 Seminar in Microbial Genetics (1) Readings and discussions based on the current literature. May be repeated. S/NC only.

6970 Seminar in Virology (1) Readings and discussions of current literature. May be repeated with consent of department. S/NC only.

6000 Doctoral Research and Dissertation

6141 Concepts of Immunity (3) Discussions, readings, and laboratory in the most recent advances of resistance to infectious disease. 3 three-hr labs.

6720 Advanced Topics in Microbial Physiology (3) Prereq: 5630 or 5720. May be repeated with consent of department.

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

6740 Advanced Topics in Virology (3) Prereq: 4521. May be repeated with consent of department.

5700 Advanced Topics in Microbial Genetics (3) Prereq: 5460. May be repeated with consent of department.

6810-20-30 Problem Seminar (1, 1, 1) Research problems and methods, critical analysis of representative works. May be repeated with consent of department. S/NC only.

Music MAJOR

Music

MAJOR

DEGREES

M.A., M.M.

Professor: R. W. Fred (Head), Ph.D. North Carolina.


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

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

Applicants who plan to pursue the degree in performance (applied music) are required to audition before the appropriate area committee. Applicants for admission to the program in composition must submit scores and tape recordings of representative works. All applicants are required to take the Diagnostic Examination in music theory and music history and literature.

General requirements for the Master's degree begin on page 17 of this catalog.

M A S T E R O F M U S I C

DEGREE CURRICULA

Voice: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in area literature, (c) 3 hours in music research, (d) 6 hours in ensemble, (e) 3 hours in theory, (f) 3 hours in M.M. recital, and (g) 12 hours in music electives.

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

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

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

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.

MUSICIAN CURRICULA

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 theory, (d) 9 hours in thesis, and (e) 6 hours in electives.

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

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

3041 Keyboard Harmony (2) Melody harmonization, figured bass realization, and improvisation. Prereq: Harmony I, sight singing and ear training, and keyboard proficiency at the 2000 level.

3051 Organ Improvisation (2) Prereq: 3041 and organ proficiency at the 2000 level.

3114-24 Choral Arranging (3, 3) Analysis of scores and writing of arrangements for choirs. 3114—male and female chorus; 3124—mixed chorus. Prereq: Instruction or consent of instructor.

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

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

3240-50 The Symphony (3, 3) Survey of symphonic literature from Mannheim School to present.

3260-70 Chamber Music (3, 3) Survey of chamber music from 1750 to present.

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

3340 Oratorio (3) Choral works other than those appropriate for church. 4001 Opera Design (3) Historical, tonal and mechanical principles of opera design.

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

4060 Advanced Choral Conducting (3) Development of knowledge and skills in choral conducting; study of various periods and composers and relationship of different styles to the conductor's art; musical analysis and practice in conducting. Prereq: Choral Conducting or equivalent.

4070-80-90 Opera Production (1, 1, 1) Problems of lyric stage: casting, program selection, production procedures, opera dramatics. Emphasis on acting technique and student participation in practical direction of opera and other works for lyric stage.

4111-21-31-41 Analysis of Music Literature (3, 3, 3, 3) Detailed examination of musical compositions by historical period with emphasis on harmony, thematic material, form and structure. Traditional and contemporary analytical techniques. 4111—1600-1750; 4121—1750-1825; 4131—1825-1850; 4141—1850 to present. Prereq: Analysis II.

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

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

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

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

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

4124 Band Arranging (3) Study and application of techniques employed in scoring for the marching and concert bands. Prereq: Instrumentation or equivalent.

4134 Band Transcription (3) Technique and application of transcribing keyboard and orchestra music for concert band; editing and re scoring. Prereq: Instrumentation or equivalent.

4210-20 Nineteenth Century Music (3, 3) Music from 1800 to 1914. 4210—musical trends from Beethoven through Wagner; 4220—musical nationalism and post-Romantic instrumental and vocal styles.

4230-40 Contemporary European Music (3, 3) Music from 1890 to World War II. 4230—music from 1890 to World War II. De bussy, Stravinsky, Schoenberg, Hindemith, Bartok and others. 4240—musical nationalism and post-Romantic instrumental and vocal styles.

4241-51 American Music (3, 3) 4241—from Colonial times through the music of Ives; 4251—from 1930 to present (Copland to Cage). Prereq: Orientation in music appreciation or equivalent.

4260 Introduction to Ethnomusicology (3) Basic attitudes and techniques of ethnomusicology. Survey of music cultures of the Pacific, Near East, Asia and Africa. Prereq: Orientation in music appreciation or equivalent.


4290 Gregorian 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 sixteenth century to 1930.

4315 Wind Chamber Music (3) Study of wind chamber music from 16th through 20th Century. Emphasis placed on interpretation, rehearsal techniques, performing 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.

5000 Thesis


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


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)

5060 Seminar in Choral Performance (3) The study of rehearsal and performance problems and techniques as allied to score reading and preparation. Particular attention will be afforded to individual problems. Prereq: 4060 or equivalent.

5100 Independent Study in Music Theory (1-3) May be repeated for credit. Prereq: Consent of department head.

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

5112 Proseminar in Music Theory (1) Lecture, analysis, research writing in theoretical topics. Prereq: Consent of Instructor.

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

5115 Theory of Computers and Music Research (3) Theory of computer applications in
music, emphasizing techniques of analysis and indexing. Prereq: Consent of instructor.

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


5121 Analytical Techniques (3) A survey of 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: 5115 or 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)

5220-30 Proseminar (3, 3) Research techniques in music emphasizing bibliographic, writing of research papers and preparation of oral reports. Prereq: Consent of instructor.

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

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

5350-50 Medieval Music (3, 3) To 1400; emphasis on early Christian chant, medieval secular song, early theory, the development of polyphony and of musical notation; transcription and editing of MSS. 5350—monody; 5360—polyphony.

5352-62 Renaissance Music (3, 3) Music from 1400 to 1600; Mass, motet, chanson, and madrigal; the use of instrumental music, performance practice, theory and notation; transcribing and editing MSS. 5352—1400-1500; 5362—1500-1600.

5353-63 Baroque Music (3, 3) Music from 1600 to 1750; rise of opera and oratorio, church and secular cantata, instrumental forms, performance practice. 5353—1600-1700; 5363—1700-1750.

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

Философия

**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) May be repeated. Maximum 9 hrs. Prereq: 3199 and consent of instructor.

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

**5600 Small Ensemble (1)**

**5602 Brass Choir (1)**

**5604 Jazz Ensemble (1)**

**5606 Trombone Choir (1)**

**5607 Tuba Ensemble (1)**

**5610 Percussion Ensemble (1)**

**5612 Baroque Ensemble (1)**

**5620 U.T. 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)**

**5656 Laboratory Band (1)**

**5657 Marching Band (1)**

**5670 Symphony Orchestra (1)**

**5680 Concert Choir (1)**

**5682 University Chorus (1)**

**5684 Campus Chorus (1)**

**5686 Men's Glee Club (1)**

**5687 Women's Glee Club (1)**

**5699 Accompanying (1)**

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

### DOCTORAL PROGRAM

Specific requirements for doctoral students in philosophy include a minimum of three academic years of graduate study involving at least 72 quarter hours credit in course work (normally 24 quarter courses or their equivalent, exclusive of credit for the thesis and dissertation) of which not less than 45 shall be in courses numbered over 5000, and of which at least nine 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.

Registration in any course in the 5000 or 6000 series (except 5050-60-70, and 5810-20-30) may be repeated for credit with the permission 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.

3111 History of Ancient Philosophy (4) Pre-Socratic through Aristotle.

3121 History of Hellenistic, Roman, and Medieval Philosophy (4)

3131 History of Seventeenth and Eighteenth Century Philosophy (4)

3141 History of Nineteenth and Early Twentieth Century Philosophy (4)

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

3311-12 American Philosophy (4, 4) Colonial to late 19th century. 3312—Late 19th century to present.

3315 American Ideals (4) Ideological variants in the American scene.

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 epistemic principles of literary arts.

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

3510 Existentialism (4)

3550 Marxism as Philosophy (4)

3630 World Religions (4) Philosophical study of major living religions. May not be taken by students who have completed any of the following: 3650-60-70. (Same as Religious Studies 3630).

3650 Philosophy and Religion in India (4) May
3770 Introduction to Philosophy (4)

3720 Science, Technology, and the Modern World: A Philosophical Approach (4)

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 (4)

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 the convenience of the department. Subject matter to be determined by mutual consent of students and instructor with approval of department. Prerequisites to be determined by department.

4111-21 Modern Religious Philosophies (4, 4) (Same as Religious Studies 4111-21.)

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

4370-71 Theoretical Issues in Medical Ethics (4, 4) Prereq for 4370: Elementary Ethics or Religious and Philosophical Issues of Medical Ethics or consent of instructor. Prereq for 4371: consent or consent of instructor. (Same as Religious Studies 4370-71.)

4410 Plato (4) Prereq: 8 hrs of philosophy or consent of instructor.

4420 Aristotle (4) Prereq: 8 hrs of philosophy or consent of instructor.

4430 Medieval Philosophy (4) Prereq: 8 hrs of philosophy or consent of instructor.

4450 Continental Rationalism (4) Prereq: 8 hrs of philosophy or consent of instructor.

4460 British Empiricism (4) Prereq: 8 hrs of philosophy or consent of instructor.

4470 Kant (4) Prereq: 8 hrs of philosophy or consent of instructor.

4480 Advanced Topics in Existentialism and Phenomenology (4) Prereq for 4480: 8 hrs of philosophy or consent of instructor.

4490 Process Philosophy (4) Prereq: 8 hrs of philosophy or consent of instructor.


4511 Advanced Topics in Logic (4) Prereq: Consent of instructor. May be repeated.

4510 Philosophical Analysis (4) Prereq: 8 hrs of philosophy or consent of instructor.

4530 Philosophy of Language (4) Prereq: 8 hrs of philosophy or consent of instructor.

4710 Philosophy of Natural Science (4) Consideration of standard topics pertinent to natural science including reduction of theories and teleological explanation. Familiarity with symbolic logic is recommended. Prereq: 3770 or 2 yrs of natural science.

4720 Philosophy of Social Science (4) Examination of methods of inquiry and modes of explanation in social sciences. Prereq: 3770 or 2 yrs of social science.

5000 Thesis

5050 Symbolic Logic (4)

5080 Philosophy of Logic (4) Nature of logic; epistemological, metaphysical and axiological assumptions and implications in various theories of logic. Prereq: 4510 or its equivalent.

5110-20-30-40 50-60 Studies in the History of European Philosophy (4, 4, 4, 4, 4) Intensive critical work on a major philosopher or a school. 5110-Greek; 5120-Hellenistic or Medieval; 5130—Modern, before Kant, 5140—Kant: 5150—19th Century, 5160—20th Century.

5250 Studies in the History of American Philosophy (4) Intensive, critical work on a major philosopher or a school.


5410 Philosophy of History (4) Theories of history and historical processes.

5430 Philosophy and Literature (4) Mutual influence of philosophy and literature, the possibility of a philosophy of literature, the philosophy of criticism.

5450 The Problem of the Self (4) Current studies in sociology, social psychology, and philosophy are used to amend and elucidate traditional philosophical treatments of the problem of the self.

5460 Philosophy of Mind (4) An examination of the relation of the mental to the physical and of the role of words in discourse for mental activities such as thinking and feeling.


5550-60 Philosophy of Science (4, 4) The nature of the subject matter and method of the sciences. 5550—Natural sciences. 5560—Social sciences.

5610 Recent Developments in Philosophy of Religion (4)

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

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

6000 Doctoral Research and Dissertation

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

6150-60 Seminars in the History of American Philosophy (4, 4)

6250 Seminar in the Philosophy of Religion (4)

6310 Seminar in Axiology (4)

6510-20 Seminars in Epistemology (4, 4)

6550 Seminar in Philosophy of Science (4)

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Physics and Astronomy

MAJOR DEGREES

Physics

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

Professors:


Associate Professors:


Assistant Professors:


Lecturer: 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, 3210-20 or 4110-20, 4210-20, 4230 or 4240 constitute the minimum course work 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 constitutes the minimum course work prerequisite to graduate study.

Graduate programs leading to the 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, molecular spectroscopy, nuclear physics, plasma physics, solid state physics, theoretical physics, and ultrasonics.

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.

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 38 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 5110-20-30, 5210-20-30, 5310-20-30, 5610-20-30 and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to nine hours of credit, and pass an oral examination on course material and thesis.

The non-thesis program is primarily designed for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking an M.S. in physics by this method must apply to the department's graduate committee for permission to enroll under this program. The requirements for the M.S. under this method are the satisfactory completion of 45 hours of course work composed of 27 hours from courses numbered above 5000 (e.g., 5110-20-30, 5210-20-30, 5310-20-30, etc.); nine hours in a minor field (e.g., mathematics); and nine 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 his 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 M.A.C.T. degree in physics requires 15 more hours of work, making a total of 60 quarter hours. Nine of these hours are specified as follows: three hours in a seminar course dealing with general problems of college teaching; three hours in a seminar course dealing with special problems in the teaching of physics; and three hours in a course dealing with the history and philosophy of physics. The other six hours of course work may be elected from any of the physics courses numbered above 5000. During the two-year program leading to the M.A.C.T. degree, the candidate will be continually engaged in supervised teaching activities.

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 students specializing in nuclear physics, Physics 6610-20-30 of students in health physics, Physics 6710-20-30 of students in solid state physics, and Physics 6810-20-30 of students specializing in molecular physics. (The Master's degree is not permitted.)

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

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

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

A program leading to the Ph.D. in chemical physics is conducted jointly with the Chemistry Department, which offers a similar degree. Physics departmental requirements for the degree in chemical physics require 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, and either 6310 or 5720; Chemistry 4160-70, 5430, and any two quarters from 5340-50, 5460, 5860, 6730 or 6610-20.

Astronomy


Physics

3210-20-50 Mechanics (3, 3, 3) 3210—Statics, kinematics, and dynamics of a particle. 3220—Statics, kinematics, and dynamics of systems of particles and rigid bodies; 3250—LaGrangian and Hamiltonian treatments of motion. Must be taken in sequence. Prereq: Fundamentals of Physics: Waves and Optics; and Multivariable Calculus and Linear Algebra.

3230 Heat and Thermodynamics (3) Concepts of temperature laws of thermodynamics; applications of laws to simple physical and chemical problems. Prereq: College physics and calculus; 3210-20 or consent of instructor.


3510-20-30 Physical Measurements (3, 3, 3) Laboratory measurement of some physical quantities. Theory supplied where necessary. Prereq: College physics and calculus; 3510 for 3520 and 3530. 3 labs.

3610-20 Electronics (3, 3) Electronic components and circuits of interest to physicists. Prereq: College physics and calculus. 3610 for 3620. 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.

3840-50-60 Health Physics Practicum (3, 3, 3) Instrumentation: legal aspects and practice of applied Health Physics; problem solving; record keeping and report writing. For students in the Health Physics cooperative program.


4110-20-30 Introduction to Quantum Mechanics (3) Introduction to the fundamental principles of quantum mechanics and methods of calculation. Applications to atomic, molecular, and nuclear physics. Prereq: Fundamentals of Physics or equivalent, advanced calculus and differential equations.

1410 Elementary Nuclear Physics (3) General properties of nuclei, two-nucleon systems, nuclear forces, nuclear models, nuclear reactions, nuclear disintegration, decay, and radioactivity. Prereq: Fundamentals of Physics: Waves and Optics; and consent of instructor.

4160 Physical Acoustics (4) Considerations fundamental to detailed investigation of any branch of acoustics; propagation of acoustic waves in the infrasonic, the audible, the ultrasonic, and the hypersonic ranges of frequencies. 3 hrs and 1 lab. Prereq: 3210-20, 3230.

4210-20-50 Electricity and Magnetism (3, 3, 3) Intermediate level electrotechnics; steady and alternating currents; laws of electromagnetism; Maxwell's equations; radiation of electromagnetic waves; reflection and refraction; electromagnetic fields of moving charges. Must be taken in sequence. Prereq: Fundamentals of Physics, general physics, or equivalent, and calculus and analytical geometry.

4230-40 Geometrical and Physical Optics (4, 4) Lactures, problems and experiments in geometrical (4230) and physical (4240) optics. Prereq: College physics and calculus. 3 hrs and 1 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. 1 hr lecture, 6 hrs lab. Prereq: Fundamentals of Physics: Electricity, Waves and Optics, Modern Physics.


4710-20-30 Introduction to Health Physics (3, 3, 3) Radioactivity, interaction of electromagnetic radiation with matter, radiation quantities and units, point kernel and extended sources, X-rays and gamma rays, neutron activation interaction of charged particles with matter, stopping power, range-energy relations, counting statistics, fundamentals of dosimetry, criticality prevention, radiation biology and ecology. Prereq: 3730.
5080 Graduate Research Participation (3) Advanced research techniques are studied under the supervision of a staff research director whose special interests coincide with the interests of the student. Open to all graduate students in good standing. May be repeated for credit with consent of department. S/NC only.

5110-20-30 Introduction to Theoretical Physics (3, 3, 3) Classical theoretical physics, with limited use of mathematics. Prerequisites: 3210-20, 4210-20; advanced calculus, differential equations, and vector analysis.

5210-30 Advanced Modern Physics (3, 3, 3) Basic principles of wave mechanics; one-electron atom; vectors; coherence; electromagnetic spectroscopy; molecular binding; relativity; properties of nuclei (spin, magnetic moments, etc.); scattering phenomena; nuclear models and forces; high-energy physics. Prerequisites: 3210-20, 3710-20-30, 4210-20, differential equations. Must be taken in sequence.

5240 Electronic Properties of Solids (3) Theory of metallic conductivities, elements of band theory, atomic and molecular spectroscopy; molecular binding; relativistic effects; magneto- and ferro-electricity, electronic and nuclear resonance and other effects. Applications discussed. Prerequisites: 4530 and 5210.

5250 Electromagnetic Properties of Solids (3) Optical properties of solids, luminescence, magnetism, dielectric properties of dielectric conductors and semicon-ductor devices. Prerequisites: 4530 and 5210.

5310-20-30 Advanced Dynamics (3, 3, 3) Equations of LaGrange and Hamilton, variational principles, the two-body problem, rigid body mechanics, special relativity, canonical transformations, normal coordinates, elasticity, fluid mechanics. Prerequisites: Coreq: 5610-20-30.


5440 Experimental Methods of Infrared and Raman Spectroscopy (3) Experimental equipment; instrument optics; detection systems; analytical methods. Analysis of the vibrating-rotating state, the electronic state. Prerequisites: 4210-20 or equivalent. (Same as Chemistry 5440.)

5460 Radiation Chemistry (3) Same as Chemistry 5460.

5510-20-30 Advanced Thermodynamics and Statistical Mechanics (3, 3, 3) Systematic derivation of thermodynamic formulas; third law; low temperature physics; phase rule; free energy and chemical equilibrium, Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Energy levels, determination of statistical mechanical relations to thermodynamics; distribution functions and partition functions. Applications to gases, liquids, and solids. Prerequisites: Coreq: 5610-20-30 or 4210-20 or equivalent. (Same as Chemistry 5540.)

5560 Numerical Methods in Physics (3) Numerical methods available for solution of physical problems, pointed toward use of automatic computing machinery; analysis of errors. Prerequisites: Consent of instructor.

5720 Physics of Polyatomic Molecules (3) Introduction to the electronic structure of molecules and the physical processes of luminescence and radioactivity; theoretical and experimental aspects of intermolecular and intramolecular electron excitation energy transfer and recombination or oscillation; energy transfer and charge transfer in such fields as organic molecular reactivity and organic scintillation. Prerequisites: 5210-20 or consent of instructor.

5910-20 Special Problems (3) Specitically assigned theoretical or experimental work on problems not covered in other courses.

5911-21-31 Special Problems in the Teaching of Physics (1, 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. Prerequisites: Consent of Instructor or corequisites: 5610-20-30.


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, molecular and nuclear physics. Dirac equation; quantum electrodynamics. Prerequisites: 4130 or 5210; 5310-20 or 5410-20-30. Whichever of the latter series is not used may be used as a prerequisite is to be considered corequisite.

6210-20-30 Nuclear Structure (3, 3, 3) General properties of the nucleus; two-body scattering problems; saturation and symmetry properties of nuclear forces; theory of light nuclei; nuclear spectroscopy; special nuclear models; theory of nuclear reactions; theory of beta-decay. Prerequisites: 6110-20-30.

6310 Electromagnetic Theory of Light (3) Classical electron theory including theories of line breadth, dispersion and absorption; scattering and polarization; applications to electromagnetic and magnetic properties of gases and solids. Optical properties of electromagnetic waves in isotropic and anisotropic media; including reflection, refraction, polarization and also theory of diffraction. Prerequisites: 5410-20-30.

6320 Special Relativity (3) Lorentz transformation; Einstein postulates; relativistic ten- sors; relativistic mechanics; relativistic electrodynamics. Prerequisites: 5310-20-30, 5410-20-30, 6310.

6330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prerequisite: 6320.

6420 Advanced Topics in Classical Theory (3) Course content is to be decided; open to special needs of students. Possible fields are: (a) advanced dynamics and hydrodynamics, (b) electromagnetic theory, (c) statistical mechanics, including theory of non-equilibrium processes. Prerequisites: 5310-20-30, 5410-20-30, 5510-20-30. May be repeated with consent of department.

6430 Advanced Topics in Quantum Theory (3) Course content is to be decided; open to special needs of students. Possible topics are: angular-momentum theory, beta-ray theory, theory of atomic spectra and other special fields of physics, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and other current problems. Prerequisites: 6110-20-30. May be repeated with consent of department.
Ph.D. Oklahoma; J. Rathjen, Ph.D.; G. Robson, Ph.D.; Maryland; B. D. Rogers, Ph.D.; Indiana; P. Schulman, Ph.D.; Johns Hopkins.

Registration in any courses in the 5000-6000 series may be repeated for credit with permission of the department.

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of promoting sound governmental administration through research, publication, and consultation. The staff is as follows: Professor Ungs (Director); Professors Plaa (Associate Director), Kronenberg (Associate Director, Nashville), Robson (Assistant Director), Assistant Professors Rogers (Nashville), Greene (Nashville); Instructors: Inscho (Nashville), Allen (Nashville); Senior Research Associate Tyer; Research Associates Rawson, Smith, Thomas.

MASTER'S PROGRAM

See general requirements on page 17.

MASTER'S IN PUBLIC ADMINISTRATION PROGRAM

The department offers two programs leading to the degree of Master of Public Administration. The first program is available through the Knoxville campus. The second is jointly offered by Middle Tennessee State University and The University of Tennessee. This program is directed primarily to career employees of federal, state and local governments in the Nashville area. Requirements for admission and graduation:

Applicants for admission to the joint degree program must have completed a Bachelor's degree from an accredited college or university and be eligible for admission to the Graduate School. (UT-MTSU applicants must gain admission to both of the sponsoring institutions and pass a qualifying examination, if required.)

Specific requirements for graduation include:

1. The completion of 45 quarter hours of approved graduate courses including nine hours of thesis work. In lieu of thesis, candidates may complete a total of 48 quarter hours of course work.
2. At least 50% of the credit hours including thesis must be in approved courses numbered 6000 and above.
3. Demonstrate command of the material covered in course work in an oral comprehensive examination. A non-thesis student must have a written examination which may be followed by an oral.
4. For the UT-MTSU program, the joint supervisory committee to which the student is assigned may require the student to complete a tools course (non-graduate credit), such as statistics, where such a course is requisite to successful completion of the program.

The student completing the joint program will receive his degree jointly from the University of Tennessee, Knoxville and Middle Tennessee State University. Inquiries concerning the UT-MTSU program should be directed to:

UT-MTSU Graduate Program in Public Administration
The Nashville Center
323 McLemore Street
Nashville, Tennessee 37203

Doctoral Program

Specific requirements for the degree of Doctor of Philosophy in political science include:

1. A minimum of 117 quarter hours, following the Bachelor's degree, is required. At least 93 hours shall be in political science. At least 72 hours in political science shall be graduate level hours (i.e. earned in 5000- or 6000-level courses). At least 45 of these graduate level hours shall be at the 6000 level. This figure includes 36 hours of credit for the dissertation.
2. Each Ph.D. candidate must pass an examination in one foreign language. Students specializing in some areas may be required to demonstrate knowledge of a second language or appropriate research tools or both.
3. Admission to candidacy shall be based on written and oral preliminary examinations which must be passed not later than three quarters before the date on which the degree is granted.
4. The candidate must pass a final oral examination on his doctoral dissertation.
5. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.

3545-46 United States Constitutional Law (4, 4) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political rights. United States Government and Politics desirable as a preceding course. 3546—Study of civil rights and liberties, with emphasis on judicial interpretation of First Amendment freedoms, rights of the accused, racial equality, and the right of privacy.

3555 Minority Group Politics in the United States (4) Content varies from quarter to quarter. May be repeated with consent of department. Maximum 8 hrs.

3565 Introduction to Public Administrative Organization and Management (4) Organization and decision-making theory, line and staff services, politics of organization, leadership and fiscal management, administrative responsibility. United States Government and Politics desirable as a preceding course. (Same as Water Resources Development 3565).

3566 Public Administration and the Policy-Making Process (4) Public bureaucracies and the policy-making process, their political environments, administration associated with policy-making, United States Government and Politics desirable as preceding course.

3615-16 Dynamics of Black African Politics (4, 4)
3621-22 Politics of Asian States (4, 4)
3625-26 Latin American Government and Politics (4, 4)

3630 Administration of Government Enterprises (3) Problems of special government enterprises, such as TVA.
3631-32 Government and Politics of the Soviet Union (4, 4)
3635-36 Politics in Western Democracies (4, 4) Political culture, consensus, and institutions of Western democratic systems.
3641-42 Government and Politics of Middle East and North Africa (4, 4)
3655 Political Change in Developing Areas (4)
3710-20 State, Regional, and Local Government and Administration (3, 3) Constitutional and political structure; Governmental organs and their relationships; Functions and administration.
3715 Contemporary Problems of Soviet Foreign Policy (4)
3801-02-03-04 Studies in Political Thought (4, 4, 4, 4)
4140-20 Administrative Law (3, 3) Powers of, procedures of, controls over administrators.
4535-36 Political Attitudes, Opinions and Communication (4, 4)
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. United States Government and Politics desirable as preceding course.
4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.
4580-91 The Urban Polity (4, 4) Analysis of political institutions and processes in metropolitan areas; urban problems and politics.
4610 The Budgetary Process (3) 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.
4630 Problems in Public Management (3) Selected problems. Emphasis on internal and external communication and information systems in government and public access to information.
4665-66 Policy-Making in Democracies (4, 4)
4675 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.
4711 International Law (4)
4740-50-60 Politics and Elections (3, 3, 3) 4740-50—Structure and function of party systems; nominations and campaigns. 4750—Voting behavior of the electorate.
4815—Contemporary Soviet Marxism-Leninism (4)
4831-32-33 The Systematic Study of Politics (4, 4, 4)
4875 Special Topics in Political Thought (4) May be repeated with consent of department. Maximum 8 hrs.
4900 Aspects of Urban Environment I (3) In-
terdisciplinary course in urban problems. Pre-

req: Consent of instructor. S/NC only. (Same 
as Architecture 4900, Psychology 4900, and 
Real Estate 4900.)

4975 Seminar in Political Science (4) Se-
lected research for seniors; primarily for ma-
jors. May be repeated with consent of de-
partment. Maximum 8 hrs.

5000 Thesis

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 137.

5103 Independent Study (1-12) See page 138.

5110-20 Seminar in Political Theory (3, 3) Se-
lected political thinkers, schools, historical peri-
ods.

5210-20-30 Seminar in World Politics (3, 3, 3) 
Research in world problems and organization.

5140 Politics, Administration and Community 
Development in Non-metropolitan Areas (3) 
Analysis of problems and processes associated 
with community development.

5150 Internship in Political Science (3-9) 
Open to student participating in approved in-
ternship programs. May be repeated with con-
sent of instructor. Maximum 9 hrs.

5211 Directed Readings in Political Science 
(3) May be taken for a letter grade or on an 
S/NC basis. May be repeated with consent of 
instructor and student's advisor. Maximum 9 hrs.

5250 Seminar in African Politics (3) Selected 
topics in African politics.

5270-80-90 Seminar in the Politics of De-
velopment (3, 3, 3) Selected topics dealing 
with political problems of the less developed 
countries.

5310-20-30 Seminar in Comparative Govern-
ment (3, 3, 3) Selected topics in modern govern-
ments.

5340-50-60 Seminar in Latin American Gov-
ernment (3, 3, 3)

5370-80 Seminar in Soviet Politics and Gov-
ernment (3, 3)

5410-20-30 Seminar in Public Law (3, 3, 3) 
Special problems in constitutional and admin-
istrative law.

5440-50 Theory and Analysis of U.S. Foreign 
Policy (3) Theoretical approaches to decision 
making in the foreign policy area and an analysis 
of the policy making process.

5510-20 Seminar in International Organiza-
tion (3, 3) 5510—Introduction to regional in-
ternational organizations; political integration 
at the international level. 5520—Functional inter-
national organizations.

5540 Seminar in Comparative Public Admin-
istration (3) Approaches to and methods used 
in comparative analysis.

5550 Seminar in Administration in Developing 
Countries (3)

5600 Public Administration (3) Survey of pub-
lic administration theory and functions, ap-
proaches to public management, contemporary 
problems in public administration.

5605 Research and Methodology in Public 
Administration (3) Introduction to basic as-
sumptions and techniques of research in pub-
lic administration; topics include measurement, 
analysis, and reporting of data.

5610-20 Seminar in Organization Theory (3, 3) 
An appraisal of major theories of organization 
and their applicability to the public sector.

5611-21-31 Seminar in State-Local Adminis-
tration (3, 3, 3)

5630 Seminar in Technology and Public Policy 
(3) Technological change and the policy process, 
government interactions with the scien-
tific community, political characteristics of the 
science enterprise.

5635-45 Operations Research for Public Ad-
ministrators (3, 3) Operations research meth-
odology; applications and limitations of O.R. 
in the public sector; linear programming, 
transportation and assignment problems, net-
work analysis, PERT, dynamic programming 
and other methods.

5640-50-60 Seminar in Metropolitan Areas (3, 3, 3)

5641 Seminar in Contemporary Public Policies 
(3) Examination of problems in one or more 
public policy areas from political and admin-
istrative perspectives. Topics to be selected by 
the instructor.

5670-80 Seminar in Policy Analysis (3, 3) Role 
of administrators in policy analysis and de-
cision making with special attention to his-
torical and current issues.

5710 Seminar in the Politics of Administra-
tion (3) An examination of public administra-
tion in the context of the American political 
system with emphasis on policy making and 
the political roles of public administrators 
and agencies.

5740 Seminar in Organizational Analysis (3) 
Organization theory applications in public man-
agement; field analysis of public organizations.

5750 Seminar in Public Management (3) 
Examination of selected problems.

5755 Seminar in Public Management (3) 
Examination of selected problems.

5760 Seminar in TVA Personnel Man-
agement Practices (3) Exploration of public 
personnel management through an in-depth 
examination of one of the national govern-
ment's foremost personnel systems—TVA, TVA 
staff and employee organization representatives 
serves as discussion leaders.

5795-75 Law and the Administrative Process 
(3, 3) Constitutional position; decisional pro-
cesses, regulation and management; limita-
tions on governmental action; questions of 
structure, role, and administrative choice.

5770 Practicum in Public Administration (3)

5780 Seminar in Fiscal Management (3) The 
fiscal management aspect in a mixed local-re-
source system; local and state 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 bureau-
cracies, legislative bodies, and advisory and 
community groups in the public sector. Se-
lected topics include budgeting, personnel, 
evaluation, and other staff functions.

5810 The American Political Process (4) 
Principal patterns of political activity linking 
citizens and political institutions.

5820 The American Political Process (4) 
Selected problems in American politics.

5850 Seminar in Comparative State Politics 
(3) Intensive readings in comparative state politics; focusing the analyzed of state 
politics, institutions and policy making.

5910-20-30 Methodology and Bibliography 
(3, 3, 3) 5910-20—Behavioral and mathematical 
approaches to research. 5930—Philosophical 
problems in research, traditional literature, and 
non-behavioral projects.

6000 Doctoral Research and Dissertation

6210 Advanced Studies in International Poli-
tics

6310 Advanced Studies in Political Theory (4) 
Research into selected topics.

6410 Advanced Studies in International Or-
ganization (3) Research into selected topics.

6430 Advanced Studies in Jurisprudence (3)

6440-50-60 Advanced Studies in Comparative 
Politics (3, 3) Research into selected topics.

6510-20-30 Advanced Studies in American 
Constitutional Law (3, 3, 3) Systematic inves-
tigation of federal relationships, civil liberties, 
courts in political settings, judicial institutions, 
personnel, and public policy contexts.

6610-20-30 Advanced Studies in Public Ad-
ministration (3, 3, 3) Research into selected 
topics.

6710 Directed Research in Political Science 
(3) May be taken for a letter grade or on an 
S/NC basis. May be repeated with consent 
of instructor and student's advisor. Maximum 9 hrs.

6810-20-30 Advanced Studies in the Political 
Process (3, 3, 3) Open to advanced graduate 
students upon approval of instructor.

**Psychology**

**DEGREES**

**Psychology**

M.A., Ph.D.

Professors:

J. F. Byrne,* Ph.D. Tennessee; H. J. Fine, 
Ph.D. Syracuse; L. Handler, Ph.D. Michigan 
State; J. F. Lubar, Ph.D. Chicago; K. R. 
Newton, Ph.D. Tennessee; H. R. Politi, Ph.D. 
Michigan; N. L. Rasch,* Ph.D. Pennsylvania; 
R. R. Shadrer, Ph.D. Tennessee; F. Samejima, 
Ph.D. Keio; W. S. Verplehu, Ph.D. Brown; 
R. G. Wahler, Ph.D. Washington; J. A. Wiberley, 
Ph.D. Syracuse.

Associate Professors:

H. S. Bacon,* Ph.D. Tennessee; C. P. Cohen, 
Ph.D. Kansas; L. F. Dropollemen, Ph.D. 
Catholic; H. R. Friedman,* Ph.D. Tennessee; 
L. H. Gangaware,* M.S. Columbia; 
S. J. Handel, Ph.D. Johns Hopkins; M. G. 
Johnson, Ph.D. Johns Hopkins; A. McIntyre, 
Ph.D. Yale; W. G. Morgan, Ph.D. Tennessee; 
W. M. Simmons, M.S.S.W. Tennessee.

Assistant Professors:

J. M. Bartow,* Ph.D. Tennessee; A. M. Ford, 
Ph.D. Michigan State; D. S. Freeman,* Ph.D. 
Tennessee; W. R. Hammond, Ph.D. Fla. 
State; H. W. Kautman, Ph.D. Rutgers; 
J. E. Lawler, Ph.D. North Carolina; 
K. A. Lawler,* Ph.D. North Carolina; 
J. W. Lounsbery,* Ph.D. Michigan State; 
K. R. Lounsbery,* Ph.D. Michigan State; 
B. F. Lyons, Ph.D. Texas (Austin); 
J. C. Malone, Ph.D. Duke; 
M. J. O'Connell, Ph.D. Tennessee; E. D. 
Sundstrom, Ph.D. Utah; H. P. Todd, Ph.D. 
California (Berkeley); C. B. Travis, Ph.D. 
California (Davis); J. G. Wallace,* Ph.D. 
Tennessee.

The Psychology Department offers a 
non-thesis Master's degree program. 
Please check with the Department for 
details.

Admission to all graduate courses is 
subject to the approval of the instructor.

The psychology section of the GRE is 
required of each applicant; a score of 650 
must be reached before entering the 
second year of graduate training.

Doctoral fields of emphasis include: ex-
perimental, physiological, cognitive, psy-
cholinguistics, learning, comparative, psy- 

* Part-time.
4610 are expected to continue into 4620 and 4630. Prereq: Human Relations and consent of instructor.

4620-30 Seminar in Group Processes (0, 6) Didactic and laboratory experience for those qualified for further training as group facilitators. Prereq: 4610 and consent of instructor. No credit given until sequence is completed.

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: Psychological Statistics.

4650 Symbolic Processes (4) The logic of signs and symbols; directed and associative thinking; memory, problem-solving, and concept-formation; the nature, use and development of language. Prereq: Learning and Thinking or consent of instructor.

4660 The Psychology of Language (4) Theories and descriptions of phonology, syntax, and semantics as applied to psychology and related disciplines. Recommended: 4850 or linguistics background.

4710 Physiological Psychology (4) Nervous system and physiological correlates of behavior. Prereq: year of biology or zoology and Biological Foundations of Behavior.

4719 Psychological Physics Laboratory (4) 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.)

4730 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: Learning and Thinking.

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-Americans. Prereq: Consent of instructor. (Same as Cultural Studies 4880.)

4890 Differential Psychology (3) The nature and sources of individual differences in behavioral characteristics, and differences among racial, ethnic, social-economic, sex, and other groups. Prereq: 4840. (Same as Educational Psychology 4890.)

4900 Aspects of Urban Environment I (3) An interdisciplinary course in urban problems. Prereq: Consent of instructor. S/NC only. (Same as Architecture 4900, Political Science 4900, Real Estate 4900.)

5000 Thesis

5019-29-39 Laboratory Techniques in Experimental Psychology (3, 3, 3) Required of all first-year students in experimental, physiological, and clinical psychology. S/NC only.

5070 Seminar in College Teaching (2) Concepts, methods, and materials in the introduction of psychology at the college level. Emphasis upon research. Required of all Ph.D. candidates. S/NC only.

5079 Practicum in College Teaching (2) Supervised teaching experience in College Teaching. Required of all Ph.D. candidates. S/NC only.

5080 Current Topics in Applied Psychology (3)

5100 Development Psychology (3) Prereq: Child Psychology or Child Study-Education Psychology. (Same as Educational Psychology 5100.)

5110 Clinical Aspects of Human Sexuality (3) Nature of sexuality; societal perspectives, personal identity, and sources of isolation and conflict in personal and professional counseling. Prereq: Consent of instructor.

5111-12-13 Seminar in Current Issues in School Psychology (1, 1, 1) Historical, legal, ethical, and technological issues impinging on school psychology practice.

5140-50-60 Psychoeducational Assessment (3, 3, 3) Historical, psychometric, and sociometric assessment methods in school learning environments. Must be taken in sequence. Coreq: 5179-89-99. Prereq: Admission to School Psychology program or consent of instructor. (Same as Educational Psychology 5140-50-60.)

5149-59-69 Practicum in School Psychology I (2, 2, 2) First-year School Psychology Program practicum core sequence. Coreq: 5140-59-60. S/NC only. (Same as Educational Psychology 5149-59-69.)

5170-80-90 Seminar in Organizational Psychology (3, 3, 3) Introduction to the concepts and ideas required for graduate study in organizational psychology. Must be taken in sequence during the student's first year. Prereq: Consent of instructor. (Same as Industrial Management 5170-80-90.)

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

5220 Readings in Psychology (2) S/NC only.

5230 Readings in Psychology (3) S/NC only.

5240 Readings in Psychology (4) S/NC only.

5250 Readings in Psychology (5) S/NC only.

5260 Special Problems in Psychology (1) S/NC only.

5270 Special Problems in Psychology (2) S/NC only.

5280 Special Problems in Psychology (3) S/NC only.

5290 Special Problems in Psychology (4) S/NC only.

5300 Special Problems in Psychology (5) S/NC only.

5319 Field Work in School Psychology: Level 1 (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to the doctoral program in school psychology who are assigned to program approved field settings. May be repeated. Maximum 6 hrs. Prereq: 5140-50-60 or equivalent. S/NC only. (Same as Ed. Psych. 5319.)

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

5350-60-70 Seminar in Psychology (3, 3, 3) (Same as Educational Psychology 5350.)

5400 Psychophysics and Scaling Methods (3) Prereq: 4239, 4490.

5420-30-40 Advanced Psychological Statistics (3, 3, 3) Prereq: 4490. Must be taken in sequence.

5445 Advanced Correlational Methods (3) Bivariate, tetrachoric, and polychoric correlation; partial and multiple correlation and regression; stepwise regression and cross-validation; sim-
ple discriminant analysis; rank correlation methods. Prereq: 5430.

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

5460 Personnel Research Seminar (3) (Same as Industrial Management 5240.)

5500 Fundamentals of Psychometrics (4) Basic ideas and orientation in psychometrics. All the graduate students who plan to take 1 or more courses in psychometrics are required to take the 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, Interpretation of Statistical Reports, 4640, and 5500.

5530 Test Construction and Interpretation (3) Construction of psychological and achievement tests, criterion development, item analysis, critical evaluation of published tests and manuals. Prereq: 5520.

5550 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: Social Psychology. May be used for credit in sociology.

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

5580 Theories of Personality (3)

5581-92-93 Clinical Psychology I: Human Development and Personality (2, 2, 2) First quarter core of the doctoral program in Clinical Psychology. Students take the 3 two-credit courses, concurrently, each covering the content area from 1 of 3 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) A research-and-theory-oriented course focusing on the origins of behavior. Prereq: 5580.

5591-92-93 Clinical Psychology I: Patterns of Adaptation (2, 2, 2) Second quarter core of the doctoral program in Clinical Psychology. Students take the 3 two-credit courses concurrently, each covering the content area from 1 of 3 major contemporary points of view.

5600 Psychopathology (3) An extension of general personality and psychodynamics into the study of patterns of behavior deviation. Prereq: 5590.

5601-02-03 Clinical Psychology I: Behavioral Deviance and Psychopathology (2, 2, 2) Third quarter core of the doctoral program in Clinical Psychology. Clinical students take the 3 two-credit courses concurrently, each covering the content area from 1 of the 3 major contemporary points of view.

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

5650 Ethics and Professional Practices (1) A review and discussion of problems arising in the practice of clinical psychology. Offered in alternate years. Prereq: M.A. in Psychology or equivalent.

5670 Forensic Psychology (2) The psychologist's role in relation to the law, including questions concerning licensure requirements, legal restrictions, and testimony as an expert witness. Offered in alternate years. Prereq: M.A. in Psychology or equivalent.

5680 Neural Basis of Behavior (3) Neuroanatomy; the basis and symptomatology of neurological syndromes encountered in clinical psychology. Prereq: M.A. in Psychology or equivalent.

5690 Psychopharmacology (3) A review and evaluation of pharmacology as it relates to psychology. Prereq: M.A. in Psychology or equivalent. Offered in alternate years.

5713 Learning Models for Techniques in Professional Psychology (1-4) A set of learning packages, each of which develops a skill in assessment, technology, child ethology, or pathology. Prereq: Consent of instructor. May be repeated. S/NC only.

5750 Ethological Psychology (3) Evolutionary and physiological basis of comparative psychology and implications for human behavior. Prereq: Introductory Biology and graduate standing.

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

5769 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory procedures central to research in physiological psychology. Prereq: 4710, 4719 and consent of instructor. May be repeated. Consent of instructor.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) (Same as Speech Pathology 5790.)

5810-20 Techniques of Psychological Examination (3, 3) Development and administration of basic examination techniques, intended primarily for use related to psychodiagnosis and research in psychology using assessment procedures. Prereq or coreq: 4640 or equivalent and consent of instructor.

5819-29 Practicum in Techniques of Psychological Examination (2, 2, 2) Coreq for 5819: 5810; Coreq for 5829: 5820.

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

5850-60-70 Psychological Appraisal (3, 3, 3) Objective and projective tests, clinical interviewing, case study preparation, organic and functional diagnosis. Prereq: 5819-29; Prereq or coreq: 5580-90-600.

5859-69-79 Practicum in Psychological Appraisals (2, 2, 2) Ordinarily to be taken concurrently with 5850-60-70.

5880 Occupational and Educational Information (3) (Same as Educational Psychology 5880.)

5889 Counseling Techniques (3) (Same as Educational Psychology 5890.)

5910-60-70 Consultation in Human Development Settings (3, 3, 3) Study of issues, models, and evaluation of the process of consultation in settings where human developmental needs and crises are managed by persons who seek aid from psychologists. Must be taken in sequence. (Same as Ed. Psych. 5910-60-70.)

5959-69-79 Practicum in School Psychology II (2, 2, 2) Second year School Psychology Program. Prerequisite: must be taken during the S/NC only. (Same as Ed. Psych. 5959-60-79.)

6000 Doctoral Research and Dissertation

6050 Experimental Methods in Sociology and Social Psychology (3) (Same as Sociology 6050.)

6100 Community Psychology (3) A survey of emerging psychological practices in intervention, evaluation and research in the community.

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 Organizational Psychology (3, 3, 3) (Same as Industrial Management 6250-60-70.)

6280-90-300 Factor Analysis (3, 3, 3) Factor analysis; component analysis; introduction to latent structure analysis. Prereq: 4640 and 5500.

6310 Seminar in Motivation and Emotion (3)

6319 Field Work in School Psychology: Level II (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to the doctoral program in School Psychology who are assigned to program approved field settings. May be repeated. Maximum of 6 hrs. Prereq: 5950-60-70. (Same as Ed. Psych. 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 Psychology (3) (Same as Industrial Management 6380.)

6390 Seminar in Psychotherapy (2) The treatment of a case, focusing upon psychodynamics, psychopathology, and the 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 the methods of evaluating the status of individuals seeking clinical aid.

6400 Seminar on Changing Concepts in Clinical Psychology (3) New developments in the field in relation to their impact on experimentation and systems of thought. Prereq: M.A. in Psychology or equivalent.

6405 Seminar in Psychopathology (3)


6411-12-14 Psychotherapy: Elective Concentration Learning Laboratory (2, 2, 2) Typically four psychotherapy concentration areas offered each quarter. Clinical students in the core psychotherapy sequence must elect at least one of these in each quarter of the sequence. May be repeated. Limited to clinical psychology students enrolled in the core psychotherapy sequence or consent of instructor.


6450-60 Advanced Psychometrics (3, 3) Construction and standardization of psychological tests, questionnaires, and rating scales, theory of errors of measurement; item analysis, scaling, equating, and norms development. Prereq: 4640, 5440, and 5500.

6491 Field Placement in Clinical Psychology Level II (1-9) Supervised Clinical experience. Required of and limited to students fully admitted to the Ph.D. program in Clinical Psychology. May be repeated. Maximum of 8 hrs. S/NC only.

6492 Field Placement in Clinical Psychology

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Level-2 (1-8) Supervised Clinical experience. Required of and limited to students fully admitted to the Ph.D. program in Clinical Psychology. May be repeated. Maximum 8 hrs. S/NC only.

6493 Field Placement in Clinical Psychology Level-3 (1-8) Supervised Clinical experience. Required of and limited to students fully admitted to the Ph.D. program in Clinical Psychology. May be repeated. Maximum 8 hrs. S/NC only.

6494 Field Placement in Clinical Psychology Level-4 (1-8) Supervised Clinical experience. Required of and limited to students fully admitted to the Ph.D. program in Clinical Psychology. May be repeated. Maximum 8 hrs. S/NC only.

6500 Seminar in Psychometrics (3) Seminar for advanced graduate students in psychometrics or quantitative psychology, to deal with advanced theories, methodologies, and their applications. Prereq: 4640, 5500 or equivalent, and consent of instructor. May be repeated with consent of department.

6550 Seminar in Advanced Social Psychology (3) Prereq: Consent of instructor.

*6560 Directed Readings in Clinical Psychology (2) Required during clinical internship; not open to others.

6575 Seminar in Mental Health Administration (3) Theory and problems in the organization and management of mental health administration.

6650-60-70 Systems Approaches in Psychological Services (1, 3, 3) Systems and organization development approaches in schools and other human services settings. Prereq: Consent of instructor. (Same as Ed. Psych. 6650-60-70.)

6659-69-79 Practicum in School Psychology III (2, 2, 2) Third year School Psychology Program practicum core sequence. S/NC only. (Same as Ed. Psych. 6599-69-79.)

*6710 Seminar in Physiological Psychology (3)

6720 Seminar in Comparative and Ethological Psychology (3)

6730 Methods of Ethological and Naturalistic Research (3) Current laboratory and field techniques. Prereq: 4729, 5750, 6720, or consent of instructor.


6760 Advanced Psycholinguistics (3) Language from psychological and associated points of view; methodological and theoretical problems. Prereq: Consent of instructor.


6870 Adult Psychotherapy (3) Prereq: 5860-90-60. Prereq or co-req: 5850-60.

6900 Field Work in Industrial and Organizational Psychology (1-15) (Same as Industrial Management 6900.)

*NOTE: Psychology 5210-5300, 5350-60-70, 5819-29, 6310-690, 6419-29-39, 6560, 6719-20-30, 6750, 6640, 6870, and/or 6900 may be repeated for credit with the approval of the department.

Religious Studies

Professors:
F. S. Lusby (Head), B.D. Colgate, Rochester, Chicago; R. Lee, Ph.D. Harvard; R. V. Norman, Jr., Ph.D. Yale.

Associate Professors:

Assistant Professors:
W. L. Humphreys, Th.D. Union; J. Kim, Ph.D. Chicago; R. Lee, Ph.D. Harvard.

Instructor:

3061-71 History of Western Religious Thought and Institutions (4, 4) 3061—1st century to the 13th century. 3062—13th century to 1900. (Same as History 3061-71.)

3210 Early Greek Mythology (3)

3220 Greek Mythology in the Classical Period (3)

3230 Roman Mythology (3)

3270 Russian Philosophical and Theological Thought (4) A survey of the development of philosophical and theological thought in Russia from the Middle Ages to the Revolution. Special emphasis on the expression of this thought in Russian literature and literary criticism. No knowledge of Russian is required. (Same as Philosophy 3270 and Russian 3270.)

3411-12-13 Renaissance and Reformation (3, 3, 3) (Same as History 3411-12-13.)

3440 Religion of Primitive Peoples (3) (Same as Anthropology 3440.)

3560 Philosophy and Religion in India (4) (Same as Philosophy 3560.)

3560 Buddhist Philosophy and Religion (4) (Same as Philosophy 3560.)

3670 Religion and Philosophy in China and Japan (4) (Same as Philosophy 3670.)

3690 Philosophy of Religion (4) (Same as Philosophy 3690.)

4111-21 Modern Religious Philosophies (4, 4) Examination of the religious implications of major thinkers and movements. 4111—Nicoletto of Cusa to Hume. 4121—Kant and the 19th century. Prereq: 9 hrs of philosophy other than logic. (Same as Philosophy 4111-21.)

4210 Topics in Ancient Israelite and Ancient Near Eastern Religions (4) Prereq: Ancient Israel's Historical and Religious Traditions, The Rise of Judaism, or consent of Instructor. May be repeated. Maximum 8 hrs.

4310 Jesus and Paul Compared (4) Jesus' teaching and activity in the context of first-century Palestinian Judaism; analysis of what the Apostle Paul made of the tradition of and about Jesus. Recommended prereq: Religion and Culture: Religions in History or Religion and Culture: Ancient Near-Eastern Religions and Images of Jesus.

4370-71 Theoretical Issues in Medical Ethics (4, 4) (Same as Philosophy 4370-71.)

4410 American Religious Thought (4) Selected figures, movements, and problems in American religious thought from colonial period to present.

4530 Topics in American Religion (4) Prereq: one of the following: Religion in America, 4410; or consent of instructor. May be repeated. Maximum 8 hrs.

4540 Social and Religious Change (4) (Same as Sociology 4540.)

4610 Topics in Western Religious Thought and Institutions (4) Selected figures, issues and institutions. Seniors and graduate students only, except by permission of department. Prereq: History of Western Religious Thought and Institutions. May be repeated. Maximum 12 hrs.

4640 Topics in Early Christianity and Helenistic Religions (4) Selected figures, issues and institutions. Seniors and graduate students only, except by permission of department. Prereq: 3650-60-70. May be repeated. Maximum 12 hrs.

4670 Topics in Eastern Religions (4) Selected figures, issues and institutions. Seniors and graduate students only, except by permission of department. Prereq: 3650-60-70. May be repeated. Maximum 12 hrs.

4690 Tradition, Change and Modernity in Asia (4) Comparative study of processes of religious and social change seen in historical context in Asian societies. Comparative focus of course will vary each year (e.g., China and Japan, India and South Asia, etc.) May be repeated. Maximum 8 hrs.

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 137.

5103 Independent Study (1-12) See page 138.

Romance Languages

MAJORS

French

† MA

Spanish

† MA, ‡ Ph.D.

DEGREES

† MA

‡ M.A.C.T.

Association Professors:

Graduate Students: 

Assistant Professors: 

Instructor: 
complete six credits in supervised in-
structional experience. French or Spanish
must be selected as the major subject,
and at least 36 hours of graduate work,
including nine hours of thesis and nine
hours of linguistics and philology, and
three hours of problems in language teach-
ing, must be completed in it. In addition,
civilization courses are strongly recom-
mended. Spanish or French must be se-
lected as the minor subject, and at least
18 hours of graduate work must be com-
pleted in it.

THE MASTER OF ARTS PROGRAM

The student may select either Plan A or B:

Plan A
1. Completion of a minimum of 36
quarter hours of which 24 must be taken
in courses numbered above 5000, includ-
ing 5011 (French or Spanish, as
appropriate).
3. A written examination covering the
course work and selected items from a
master reading list.
4. A final oral examination covering the
thesis.

Plan B
1. Completion of 45 quarter credits of
which 33 must be in courses beyond 5000,
including 5011 (French or Spanish, as
appropriate).
2. Three term papers that have been
accepted as satisfactory by the Advisory
Committee.
3. A written examination covering the
course work and selected items from a
master reading list.

THE DOCTORAL PROGRAM

Residence and Course Work:
Completion of at least three consecutive
quarters of full-time residence; a minimum
of 81 credit hours in course work beyond
the Bachelor's degree or its equivalent; and
a dissertation (36 credit hours).

No less than 54 quarter hours should be
taken in courses pertaining to the stu-
dent's major field; of these a minimum of
18 hours are to be taken in courses above
6000, a maximum of 12 hours may be taken
in courses of the 4000 level and the rest
of major division courses in a modern or ancient
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 examina-
tion, both written and oral, covering the
major and minor fields must be passed
before a student can become an official
candidate for the degree. This preliminary
examination is to be held at the time
depth deemed most appropriate by the student's
major advisor and his committee. The can-
didate is expected to defend his disserta-
tion in a final oral examination.

For additional information on the pro-
gram, consult pages 19-22.

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. Readings include: The
Arabian Nights, The Rubaiyat of Omar Khay-
yan 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 137.
5102 Off-Campus Study (1-12) See page 137.
5103 Independent Study (1-12) See page 138.

French

3010-20-30 Elements of French for Upper Di-
vision and Graduate Students (3, 3, 3) For
graduate students preparing for language ex-
aminations, and desiring reading knowledge
of second foreign language. Prereq: 2 years
of some foreign language in college or con-
sent of department. Undergraduate credit only.
No auditors.
4010 Masterpieces of French Literature in
English Translation (3) No foreign language
credit.
4020 Masterpieces of French Drama in En-
GLISH TRANSLATION (3) No foreign language
credit.
4110-20-30 French Literature of the Seven-
teenth Century (3, 3, 3) Prereq: Intermediate
French (3rd quarter) or equivalent.
4150 Theatrical French (1-3) Performance in
one or more French plays. May be repeated
with consent of department. Prereq: 1 year of
Intermediate French or equivalent and consent
of the instructor.
4160-70-80 Advanced Conversation (2, 2, 2)
Intensive preparation for oral and written commu-
nunications. Subjects range from travel and
current events to literature and aspects of na-
tional culture. Prereq: Completion of 8 hrs
of courses on 3000 level.
4120-20-30 Phonetics and Advanced Grammar
(3, 3, 3) Prereq: Intermediate French
(3rd quarter) or equivalent.
4250 Introduction to Descriptive Linguistics
(3) Phonetics and phonemics, morphology
and syntax. Types of languages, linguistic groups,
dialects and dialect geography. The applica-
tion of descriptive linguistics—field linguistics,
dialect study; its practical use in learning
languages and in language teaching. An intro-
duction to transformational grammar. Prereq:
9 hrs of upper division English, or 9 hrs of
courses on 3000 level.
4270 Introduction to Comparative Linguis-
tics (3) Topics vary. May be repeated with permission
of the department. Prereq: 4270 or its equiv-
alent. (Same as German 4250.)
4530-40-60 Medieval French Literature (3, 3, 3)
Medieval works in modern French texts. Prere-
req: Intermediate French or equivalent.
4410-20-30 French Civilization (3, 3, 3) Prereq:
Intermediate French (3rd quarter) or equi-

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3010-20-30, courses in literature in translation,
and general courses in Latin and Greek re-
quiring no knowledge of these languages), or
consent of the department. (Same as Ger-
man, Spanish and Russian 4250.)
4260 Introduction to Historical and Compara-
tive Linguistics (3) (Same as German 4260.)
4270 Introduction to Romance Linguistics (3)
A study of the development of Classical Latin
through Vulgar Latin into the major Romance
Languages. (Same as Spanish 4270.)
4310-20-30 French Literature of the Eighteenth
Century (3, 3, 3) Prereq: Intermediate French
(3rd quarter) or equivalent.
4350-40-60 Medieval French Literature (3, 3, 3)
Medieval works in modern French texts. Prere-
req: Intermediate French or equivalent.
4410-20-30 French Civilization (3, 3, 3) Prereq:
Intermediate French (3rd quarter) or equi-

4510-20-30 French Literature of the Nine-
teenth Century (3, 3, 3) Prereq: Intermediate
French (3rd quarter) or equivalent.
4540-50-60 French Literature of the Sixteenth
Century (3, 3, 3) Prereq: Intermediate French
(3rd quarter) or equivalent.
4710-20-30 French Literature of the Twentieth
Century (3, 3, 3) Prereq: Intermediate French
(3rd quarter) or equivalent.
5000 Thesis
5011 Techniques in Literary Analysis (2) Re-
quired for either Plan A or Plan B of the M.A.
program. An intensive course in explica-
tion de texte.
5101 Foreign Study (1-12) See page 137.
5102 Off-Campus Study (1-12) See page 137.
5103 Independent Study (1-12) See page 138.
5110-20-30 Old French (3, 3, 3) Medieval
French language and literature.
5151-61-71 Bibliography and Methods of Re-
search (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)
5310-20-30 French Directed Readings (3, 3, 3)
5350-60-70 The Philosophes (3, 3, 3) Textual
analysis of the works of Voltaire, Diderot,
Rousseau, and other 18th century writers.
5410-20-30 The French Novel (3, 3, 3)
5450-60 Lyric Poetry of the Nineteenth
Century (3, 3) 5450—German and English in-
fluences on French Romanticism and the gen-
eration of the poets of "le mal du siecle."
5460—Victor Hugo; the Parnassians.
5470 Baudelaire and the Symbolists (3) A study
of Les Fleurs du mal and Petits poèmes en
prose with especial emphasis upon the
theories of color and "correspondances" and
their influence on the Symbolist school.
5510-20-30 The French Drama (3, 3, 3)
5610-20-30 Trends in Contemporary French
Literature (3, 3, 3)
5650-60 Advanced Syntax and Stylistics (3, 3)
Readings and written imitations of modern
literary style in the form of compositions,
sketches and original stories.
5670 Problems in Romance Linguistics (3)
Topics vary. May be repeated with permission
of the department. Prereq: 4270 or its equi-

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 (3rd quarter) or equivalent.

3310-20-30 Italian Literature in English Translation (3, 3-4, 3-4) 3510—The Sicilian School, the Florentine School, Dante, Petrarch, Boccaccio, Machiavelli, Ariosto, Tasso. 3320—From the Baroque to the 18th century, commedia dell'arte, Vico, Leopardi, 3330—Twentieth century, Carducci, Pirandello, Quasimodo, D'Ammunzio, Croce, Moravia. No foreign language credit. No change in credit hours after add deadline. Option of 4 hours 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, 3-4, 3-4) 4010—La commedia dell'arte and major works of Machiavelli, Metastasio, Affieri, Goldoni. 4020-30—Twentieth century theatre: operatic drama, the Grottesco, Pirandello, De Filippo, Frati. No foreign language credit. No change in credit hours after add deadline. Option of 4 hours credit must present an 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 not majoring in Italian in other departments. (Same as Comp. Lit. 4050-60-70.)

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level.

4220 Petrarch (3) Prereq: 3520 or equivalent.

4230 Boccaccio (3) Prereq: 3520 or equivalent.

4330 History of the Italian Language (3) Prereq: 3520 or equivalent.

4410-20-30 The Literature of the Rinascimento (3, 3, 3) From Pulci to Tasso, the Quattrocento, and the Cinquecento. Prereq: 3520 or equivalent.

4580 The Modern Novel (3) Prereq: 3520 or equivalent.

4580 The Modern Theatre (3) Prereq: 3520 or equivalent.

4610 Contemporary Theatre (3) Prereq: 3520 or equivalent.

4620 Contemporary Poetry (3) Prereq: 3520 or equivalent.

4630 Contemporary Prose (3) Prereq: 3520 or equivalent.

5011 Techniques in Literary Analysis (2) An intensive course in explication de texte.

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 137.

5103 Independent Study (1-12) See page 138.

5110-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of the department.

5710-20-30 Seminar in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of the department.

Portuguese

3510-20 Aspects of Portuguese Literature (4, 4) Prereq: Intermediate Portuguese or equivalent. Recommended for literature majors.

4510-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) May be repeated with consent of instructor.

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 137.

5103 Independent Study (1-12) See page 138.

5110-20-30 Old Spanish (3, 3, 3) Medieval Spanish language and literature.

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


5211-21 Don Quixote (3, 3) Must be taken in sequence.

5231 The Exemplary Novels, Peralles y Sigia- munda (3)

5250-50 The Generation of '98 (3, 3) Angel Ganivet, Giner de los Rios, Baroja, Unamuno, Valle Inclan, Benvenente, Azorin, Perez de Ayala.

5270 The Contemporary Novel (3) The Civil War and post-Civil War period.

5310-20-30 Directed Readings (3, 3, 3)

5311-21-31 Special Topics in Spanish or Span- ish American Literature (3, 3, 3) May be repeated.

5340 Problems in Hispanic Culture (3) Intensive study of 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 permission of the department. Maximum 6 hrs.

5510-20-30 The Spanish Theatre After the Golden Age (3, 3, 3) 5510—From the 18th century through Realism. 5520—From Realism through the Generation of 1898. 5530—Contemporary Theatre.

5550-50-70 The Golden Age Theatre (3, 3, 3) 5550—Introduction to the Spanish theatre, Lope and Tirso, 5560—Castro, Mira de Ame- scua and Alarcon. 5570—Rojas Zorrilla, Moreto, and Calderon.

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 (3, 3, 3)

5631 Spanish American Essay (3)

5632 The Spanish American Short Story (3) The short story as a major literary genre in Spanish America. Reading and criticism of the works of authors such as Darie, Quircoa, Borges, Arreola, and Rulfo.

5633 Twentieth Century Latin American Theatre and Film (3) Readings from the works of playwrights as Carlos Sotolanza, Rodolfo Usigli, Conrado Niel Roxlo, Roberto Cossa, René Marqués and Sebastián Salazar Bondy. Presentation of films as adaptations of classical muwashshah, the colloquial zajal, and the later vallencios. Readings in Arabic and Spanish. (Same as Arabic 5070-80-90.)

5610-20-30 Hispano-Arabic Literature and Culture (3, 3, 3) 5070—General culture history, philosophy in Arab Spain. 5080—De- velopment of the traditional marketplace story, or episodic prose narrative, into the modern novel of character after the invention of print- ing. 5090—Mutual influence of traditional Arabic poetry and the popular and native Spanish choral lyric; development of the classical muwashshah, the colloquial zajal, and the later vallencios. Readings in Arabic and Spanish. (Same as Arabic 5070-80-90.)

5101 Foreign Study (1-12) See page 137.

5102 Off-Campus Study (1-12) See page 137.

5103 Independent Study (1-12) See page 138.

5510-20-30 Old Spanish (3, 3, 3) Medieval Spanish language and literature.
Introduction to the works of Latin American women writers, focusing on the feminine point of view, the modern image of woman, male-female relationships and society as a context for woman’s destiny. Readings from poetry and fiction, including such authors as Alfonsina Storni, Delmira Agustini, Gabriela Mistral, Silvina Ocampo, Silvina Bullrich, Silvina Storni, Delmira Agustini, Gabriela Mistral, and fiction, including such authors as Alfon-
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sina Storni, Delmira Agustini, Gabriela Mistra
grams for social control. Prereq: 4310 and 5520.

6530 Sociology of Law (3) An analysis of the social and cultural factors influencing the emergence and maintenance of law as a social institution and affecting the relations between law and deviant behavior; an appraisal of the theoretical and applied methodological issues encountered in studying the 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 formal organizational theories; bureaucracy; functions of theoretical models of organizations; major organizational variables; organizational authority patterns; communication in formal organizations. Prereq: 3610-20.

6620 Seminar in Formal Organization (3) Methods of studying organizations; organizational change and the effect of technology; social consequences of automation; unionization and organization; organizations and community interrelatedness. Prereq: 3610-20.

6630 Seminar in Formal Organization (3) Comparative organizational analysis; case studies, selected readings; personality and organization. Prereq: 3610-20.

6710 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in the research and current position of theory.

6810 Advanced Studies in Social Psychology (3) Social interaction and personality; the genesis and functioning of the self; the interplay of social structures and individual actions; theories of social psychology related to these problems and recent research are discussed. May be repeated. Prereq: Social Psychology 5640 or Psychology 5550.

6840-50 Social Change (3, 3) Major theories, methods and research.

6940 Advanced Studies in Urban Sociology (3) Field work projects and community studies examined and/or applied in specified areas. Prereq: 3410-20.

Spanish

See Romance Languages

Speech and Hearing Sciences

See Audiology and Speech Pathology

Speech and Theatre

MAJOR

DEGREES

Speech and Theatre

M.A., M.A.C.T.

Professors:

R. G. Allen (Head); D.F.A. Yale; R. M. Cothran; L. W. Lester, Ed.D. Tennessee; R. R. Mashburn

P. L. Soper, Ph.D. Cornell; A. Quayle

Speech and Theatre

Louisiana.

N. W. Henshaw, Ph.D.

Diploma, R.A.D.A.; G. A. Yeomans, Ph.D.

Professors:


Assistant Professors:


MATER'S PROGRAM

The departmental requirement for the M.A. degree in Speech and Theatre is 45 quarter hours (inclusive of hours taken toward a minor), at least 23 hours of which must be earned in courses numbered 5500 or above.

For the degree of Master of Arts in College Teaching, 57 quarter hours are required, in addition to 5110-20-30, Continuing and Higher Education. Students seeking the M.A.C.T. degree are allowed to substitute nine quarter hours of course work for the Master's thesis.

Speech and Theatre 5110 is required of all M.A. and M.A.C.T. students.

Speech

3011 Persuasion (4) Persuasive discourse: its psychological, sociological and cultural dimensions.

3021 Group Communication (4) Communication theory in its application to small groups, especially discussion groups; communication barriers, nonverbal communication, business communication.

3541 Rheotetical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address.

4222 Advanced Argumentation and Debate (4) Prereq: Argumentation and Debate or consent of instructor.

4461 Quantitative Research Methods in Speech Communication (4) Designing experiments; planning field studies; using statistical analysis.

4551 Southern Oratory (4) Historical and critical study of public address in the South.

4550 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public address in campaign for women's rights from the 1830's to the present.

4571 British Oratory (4) Historical and critical study of British public address.

4582 Public Discussion of Race (4) History and criticism of racial advocacy in America.

4591 Persuasive Uses of Imaginative Literature (4) Topics in social and political uses of novels, plays, and poems.

4811 Advanced Phonetics (4) Phonetic aspects of contemporary dialects of the English language. 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 intrapersonal, interpersonal, 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 Communications (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.

5450 Studies in Collection and Use of Re-
Speech and Theatre

4170-80-90 Film History and Theory (3, 3, 3) Analysis of cinematic forms and styles. 4170-80-90 Film History and Theory (3, 3, 3)

4651 Theories of Oral Interpretation (4) Theories concerning the literary, psychological, communicative, and aesthetic approaches to the methods and techniques of oral interpreta-

4661 Production Techniques for Oral Interpretation (4) Problems in collection, adapta-

5000 Thesis

5110 Introduction to Graduate Research in Speech and Theatre (3)

5120 Directed Reading and Research (3) May be repeated. Maximum 9 hrs.

Theatre

3121-22 Advanced Acting (4, 4) Prereq: Consent of instructor.

3151-52 Major Productions (4)

3153 Outdoor Repertory Production (4)

3221-22 Introduction to Scene Design (4, 4) Descriptive drawing as an approach to three-


3282 History of American Theatre (4, 4) Development of theatre as social institution in American life. 3252—from its beginnings to 1900. 3253—from 1900 to present.

3321-22 Introduction to Lighting Design (4, 4) Mechanics of stage lighting; elementary theory; problems in basic lighting practice. Prereq: Stagecraft or consent of instructor. Must be taken in sequence.

3451-52 Play Directing (4, 4) Must be taken in sequence. Prereq: Acting.

3511-12 Introduction to Theatre Costume Design (4, 4) Costume as an expression of character on stage; the application of costume history to specific design projects. Prereq: Basic stage costume or consent of instructor.

4133-34 Special Problems in Acting (4, 4) Advanced exercises in voice and movement; preparation of major role under performance conditions. Prereq: Advanced acting and consent of instructor.

4151-52 Major Productions (4, 4) Continuation of 3151-52. 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.

4241-42 Advanced Scene Design (4, 4) Play interpretation through scenic means; setting as environment and dramatic action. Prereq: 3221-22 and consent of instructor.

4341-42 Advanced Lighting Design (4, 4) Relationship of light to setting in creating stage environment. Prereq: and consent of instructor. Must be taken in sequence.

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 eight semester hours; (2) 12 quarter or eight semester hours of general inorganic; (4) Mathematics, nine quarter or six semester hours including differential and integral calculus; (5) Physics, 12 quarter or eight 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.

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.

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 amount of literature relevant to his major field of study. The student has the option of demonstrating his 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 his 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.

3071 Immunology (3) (Same as Microbiology 3071)

3080 Principles of Animal Physiology (5) Physiology of organ systems of animals in-
Ecology. 3 hrs and 2 labs.

Physics. 3 hrs and 1 lab.

Sensory, effector and integrative physiology. Coreq: 4250.

4250 Comparative Animal Physiology, I (3) Coreq: Cell Biology, General Ecology or consent of instructor.

4240 Animal Ecology (4) Environmental factors determining the distribution and numbers of animals; intraspecific relations; problems and methods. Prereq: General Ecology. 2 hrs and 2 labs.

4250 Comparative Animal Physiology, I (3) Environmental physiology. Survey of physiological mechanisms and their relation to ability of animals to survive in diverse physical environments. Prereq: Cell Biology, General Ecology and 2 yrs. chemistry.

4259 Comparative Animal Physiology Labora-
yory, I (1) Coreq: 4250.


4269 Comparative Animal Physiology Labora-

4280 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates and invertebrates. Their role and interaction in maintenance of the organism and species. Prereq: Principles of Animal Physiology or General Endocrine and Endocrine Function, 3 hrs and 1 (3 hr) lab.

4290 Herpetology (4) Classification, distribution, life histories, collection and identification of amphibians and reptiles, primarily of local species. 2 hrs and 2 labs or field periods.

4300 Ornithology (4) Morphology, physiology, behavior, reproduction, evolution, field identification. 2 hrs and 2 labs or field periods.

4310 Animal Cytology (4) Structure and function of cells and their components; special emphasis on mitosis and meiosis. Recommended prereq: General Genetics. 2 hrs and 2 labs.

4320 Microtechnique (4) Prereq: 3320 recommended. 2 hrs and 2 labs.

4369 General Genetics Laboratory (2) Experiments designed to illustrate basic principles of inheritance. Prereq: General Genetics. 2 labs.


4410 General Parasitology (4) Morphology, taxonomy and ecology of parasitic worms and protozoa, with emphasis on host-parasite relationships. 3 hrs and 1 lab.

4430 Medical Entomology (4) Distinctive morphological features, distribution, life histories, and control of arthropods that parasitize man or serve as vectors of human pathogens. Recommended prereq: Agricultural Biology 3210 or General Ecology. (Not open to students with credit for 3430.)

4450 Protozoology (4) Morphology, taxonomy, and physiology of protozoa in relation to fundamental biological concepts. 2 hrs and 2 labs. Recommended prereq: Cell Biology.

4510 Freshwater Fishery Biology (4) (Same as Wildlife and Fisheries Science 4510.)

4610-20 Comparative Animal Pathology (2, 2) Abnormal morphological changes and their causes. 4610—Organ, organ system, and organism changes. Recommended: 3060, 3080, 3320.

4619-20 Comparative Animal Pathology Labora-
yory (2, 2) g 519—Cell and tissue changes. 4620—Organ, 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: General Chemistry, General Ecology. Recommended: General Botany and Intro. Phys. 2 hrs and 2 labs (4660); 3 hrs and 1 lab (4670). Must be taken in sequence, except with consent of instructor. Not open to students with credit for former 3640 or 4650.

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) 4810—Internal morphology of both generalized and specialized forms. 4820—Taxonomy of major orders. 4830—Taxonomy of minor orders and immature forms. Prereq: 3110 or consent of instructor for 4850-30. 2 hrs and 2 labs.

4840 Physiology of Exercise (4) Functions of body in muscular work; physiological aspects of fatigue, training, and physical fitness. Prereq: Human Physiology or 3080. 3 hrs and 1 lab. (Not open to students with credit for 3940.)

5000 Thesis

5092 Graduate Research Participation (3) Advanced research techniques are studied under the supervision of a staff research director while the student works in a research area of broad interest to the student. Open to all graduate students in good standing. Prereq: Consent of department and research director. Course may be repeated with consent of the department. S/NC only.

5110-20-30 Special Problems (2, 2, 2)

5150 Zoological Bibliography (1) Study and practice in methods of locating and using zoological literature, bibliographies, and abstracts, and of preparing bibliographies and scientific papers.

5180 Fresh Water Invertebrate Zoology (4) Morphology, taxonomy and life histories of fresh water invertebrates exclusive of insects. Laboratory and field study. Prereq: 3150.

5210 Plant Parasitic Nematodes (4) (Same as Agricultural Biology 5210.)

5220-40-60 Advanced Vertebrate Physiology (4, 4) Advanced vertebrate cellular and systemic physiology; 5220—membrane, blood, immunity, neurophysiological mechanisms and muscle physiology; 5230—respiratory, cardiovascular, renal, thermo-regulatory, and digestive physiology; 5240—endocrinology, physiological genetics, reproductive physiology, sensory physiology, and aging. Must be taken in sequence, except with consent of instructor. Prereq: 3060. Coreq: Biochemistry 4120.


5270 Advanced Neuroumuscular Physiology (5) Cellular and molecular aspects of phenomena associated with excitation and muscular contraction. Prereq: 4250. 3 hrs and 2 labs.

5280 Insect Physiology (4) Functions and interrelationships of the systems relative to metabolism, growth, coordination, movement, and reproduction. Prereq: 4810, 1 yr. General Chemistry or consent of instructor. 2 hrs and 2 labs.

5290 Quaternary Problems (4) (Same as Geology 5290.)

5310-20 Seminar in the Teaching of College Zoology (2, 2) Current concepts and principles in the teaching of zoology; modern techniques and instrumentation; supervised application of teaching principles and methods. Must be taken in sequence. Prereq: Consent of instructor. S/NC only.

5350 Biometry (3) Statistical methods used in analysis of quantitative biological data. Prereq: 1 quarter statistics or consent of instructor.

5410 Advanced Parasitology (4) Life cycles, biology, control, collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.

5430 Advanced Medical Entomology (3) Prereq: 4430.
6310-20-30 Seminar in Cytology (2, 2, 2) Pre-req: 4310.

6710-20-30 Seminar in Ecology (2, 2, 2) Pre-req: Consent of Instructor.

6810-20-30 Seminar in Entomology (2, 2, 2) Pre-req: 4 hrs of graduate course work in department.

6910-20-30 Seminar in Radiation Biology (2, 2, 2) Pre-req: 4310; General Genetics; Physics 3410-20-30.

Interdepartmental Program In Radiation Biology

John R. Totter, Director

MAJOR

DEGREE

Radiation Biology

M.S., Ph.D.

A graduate major in the field of Radiation Biology is offered through the Institute of Radiation Biology. This is a program covering 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, by special permission, at one of the Oak Ridge laboratories. Problems selected for thesis research shall involve the interaction of radiations or long-lived fission products with biological systems at the molecular, cellular, organ, or ecological level of complexity. Areas of radiation specialization include biochemistry, biophysics, cytology, ecology, electron microscopy, embryology, entomology, genetics, hematology, immunology, microbiology, molecular biology, oncoLOGY, parasitology, pathology, physiology, and tissue culture.

Requirements for Admission: 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, nine quarter hours; potential candidates for the Doctor's degree, differential and integral calculus. (4) For the Ph.D. program, Graduate Record Examination scores.

Requirements for the Master of Science Degree: Course requirements shall include: (1) Zoology 5610. (2) Zoology 5620 or 5770 or 5780. (3) Zoology 5350 or Plant and Soil Science 3610. (4) Chemistry 3810 or Botany 5240. (5) Biochemistry 4100-20. (At least one-half of a student's program must be at the 5000 level.) A thesis is required of all students.

Requirements for the Doctor of Phi-

losophy Degree: (1) Courses: In addition to those required for the Master's degree, Chemistry 4140-50 or 3410-20-30; Physics 3710-20-30; Chemistry 3810 may be substituted for Physics 3730; Zoology 5620. Additional courses are determined by the student's faculty committee.

The special field of interest of the student and his 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 in The University of Tennessee Graduate School of Biomedical Sciences at Oak Ridge. (2) The preliminary examination will consist of oral and written portions in Radiation Biology and in allied fields in which the candidate has received training. (3) Candidates will be required to pass before the preliminary examination is taken the official reading examination of the University in only one foreign language, or must earn a "B" average or at least a "B" in the last quarter of an appropriate language sequence, but the student's faculty committee may require other levels of training or proficiency in an additional foreign language. (4) The final examination will be an oral examination covering the candidate's dissertation and such other fields as the candidate's faculty committee may specify.

Regular attendance at the weekly Radiation Biology Seminar or an appropriate Departmental Seminar is expected of all students.

General Information for the College of Liberal Arts

FOREIGN STUDY COURSES

Foreign study courses offered in some departments of the College provide an opportunity to undertake independent study outside the United States. Prior to departure, the student must have a plan of study approved by the department head and a supervising faculty member of the department concerned. Credit will be given only upon fulfilling all requirements set by the department and may vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

OFF-CAMPUS STUDY

Recognizing that learning is not restricted to formal classroom situations, the College provides for students to earn credit toward graduation for approved off-campus study. Such study may be undertaken only with prior approval of the faculty member and the department concerned. It may include certain kinds of work experiences, community involvement, working in political campaigns, etc. Credit per semester will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.
INDEPENDENT STUDY

Certain educational goals may best be met through independent study done by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain the approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

School of Nursing

Sylvia E. Hart, Dean

4770 Comprehensive Health Assessment (4)
Principles and theories underlying health screening of children and adults, including health history, interviewing and physical examination. 20 hrs lecture and 80 hrs lab or practice.
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 United States Energy Research and Development Agency, 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 his 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 four research areas available for a Masters and Ph.D. thesis work are Biochemistry, Cellular, Developmental and Mammalian Biology, Biophysics, and Genetics. Included are such subjects as: Microbiology, Cell Physiology, Immunology, Protein and Enzyme Chemistry, Nucleic Acid Chemistry, Cytology, Radiation Biology, Virology, Developmental Biology, Carcinogenesis, Plant Physiology and Photosynthesis, Experimental Pathology, Microbial and Mammalian Genetics, Problems of Aging, and Chemical Mutagens and Carcinogens.

ADMISSION

A Bachelor's degree or its equivalent is required. Students with M.S., D.V.M., or M.D. degrees are also encouraged to apply. The student will need previous training in biology, including general genetics, calculus, physics, and organic and physical chemistry. It is possible to remedy deficiencies in biology, general genetics and physical chemistry during the first year of residence. All other deficiencies in meeting entrance requirements should be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing, and completed applications for admission should be sent to: Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

DOCTOR OF PHILOSOPHY DEGREE PROGRAM

Requirements for the Ph.D. degree are:

1. Satisfactory (B grade or better) completion of the following courses or their equivalent: Physical Chemistry (5070-80); Biochemistry (5110-20); Biophysics (5140); Advanced Genetics (5180); Molecular Genetics (5170); Cell Biology (5180-90); and Mammalian Physiology (5200).

2. One year of either Biomedical Sciences Laboratory (5310-20-30-40) or Graduate Research Participation (5430-60-90).

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.

5. Participation in at least three courses in the advanced area of the student's interest.


This examination will be given at the end of the student's first academic year, unless other arrangements are made between the student and the Director of the Biomedical Graduate School. Such arrangements should be made during the student's first quarter in attendance at the School.

The faculty of the Graduate School of Biomedical Sciences recognizes that all students must demonstrate proficiency in basic background and fundamental knowledge in biology; i.e., the scientific information covered, in part, by the Core Curriculum of the Graduate School of Biomedical Sciences and integration of this knowledge in a fashion necessary to conduct research in a planned and logical manner.

7. Satisfactory performance on an oral examination at the end of the student's second academic year.
This includes the ability to formulate specific hypotheses and experiments and to present and defend these ideas orally before a selected group of scientists.

8. A dissertation reporting the results of original and significant scientific research.


10. 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 Laboratory. However a limited number of students from other institutions will be accepted if qualified and as space is available.

Requirements for the M.S. degree are:

1. Registration for or illustrated proficiency in the following core courses:
   - Biostatistics (5110-20); Cell Biology I (5180); Cell Biology II (5190)
   - any three of the following four courses: Biophysics I (5140); Advanced Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (six to 15 credit hours) with electives. The student will need previous training in biology, including calculus, physics, organic and physical chemistry.

2. 45 credit hours of approved graduate courses including a minimum of nine quarter hours for Thesis (maximum 18 quarter hours for thesis preparation). 

3. A pass on the candidacy: Completion of any required prerequisite courses and approximately 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. Pass a final oral (or oral and written) examination as determined by the student's committee.

Full-Time Faculty

Professor:
D. Bilen (Director), Ph.D. Tennessee.

Associate Professors:

Assistant Professor:
W. N. Weiss, Ph.D. Glasgow, Scotland; Research Assistant Professor:
C. T. Hadden, Ph.D. Washington.

Shared Faculty


8. 45 credit hours of approved graduate courses including a minimum of nine quarter hours for Thesis (maximum 18 quarter hours for thesis preparation).

5. Pass a final oral (or oral and written) examination as determined by the student's committee.

Courses

5000 Thesis

5070-80 Physical Chemistry for the Life Sciences (3, 3) Thermodynamics: phase equilibria; chemical equilibria; electromotive force; surface chemistry; electrolyte solutions; kinetics; conductance; viscosity; diffusion.

5110-20 Biochemistry (3, 3) Chemistry of carbohydrates, lipids, proteins, nucleic acids, and coenzymes; enzymes; kinetics; intermediary metabolism and photosynthesis; biosynthesis of amino acids, purines, pyrimidines, lipids, and macromolecules. Coreq: 5070-80

5140 Biophysics I (3) Energy levels and electronic states of molecules; quantum instrumentation; adaptations to system perturbations; properties of macromolecules in solutions; molecular conformations of ionizing radiation on molecules, viruses, and cells; photochemistry and photobiology; repair mechanisms. Prereq: 5140.


5170 Molecular Genetics (3) Molecular biology of genetic processes. Gene regulation; coding; protein synthesis; suppression of missense and nonsense mutations; mutagen mechanisms; complex mutation; recombination. Prereq: 5110-20, 5160.

5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of eukaryotic cells. Pertinent instruments and techniques; meiosis and mitosis; cell cycle; chromosome structure; nuclear RNA metabolism; nucleoli and ribosome biogenesis; survey of specialized cells. Structure of genetic transcription and translation in bacteria. Coreq: 5110.

5190 Cell Biology II (3) Comparative bio-chemical approach to cell structure and function. Membrane systems and metabolism; development and function of mitochon
dria; endoplasm, peroxisomes, other organelles as related to metabolism and regulation; transport proteins in cell cycle. Prereq: 5110, 5180; Coreq: 5120.

5200 Mammalian Physiology (3) Survey of mammalian organ systems and their functions. Nervous, muscular, endocrine, digestive, respiratory, circulatory, and integumentary systems will be included; interrelationships of these systems and fundamental importance of these interactions in contemporary biological research. Prereq: 5190.

5230 Biochemical Concepts in Medical Sciences (3) Biochemical mechanisms involved in physiological conditions and pathological processes of human body. Dynamic functions of organ systems; biochemical pharmacology; hormone actions; neurotransmitters. Emphasis is placed on current biochemistry advances in basic and clinical medicine. Prereq: 5200, 5110-20.

5310-20-30-40 Biomedical Sciences Laboratory (3, 3, 3, 3) Laboratory courses designed to acquaint students with both the approaches and technologies in various areas of modern biology. Students will spend a quarter in each of three or four laboratories conducting research in different areas of biomedial science. Required of all first-year students.

5350-60 Biomedical Sciences Seminar (3, 3) Critical analyses of current journal publications in a selected area of modern biology. Written evaluation of papers and weekly oral presentations by each student. Required of all first-year students.

5370 Biomedical Sciences Seminar (3) Basic principles of scientific writing. Research articles; grant and thesis proposals; abstracts; review articles; progress reports. Required of all first-year students.

5430-60-90 Special Graduate Research Participation (3, 6, 9) Special and unscheduled research project assigned on an area not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

5510-20-30-40 Special Topics in Biomedical Sciences (3, 3, 3, 3) Given either as tutorials or as formal lectures. Potential topics for such courses include: X-ray diffraction and crystallography; excited-state biophysics; physical chemistry of macromolecules; cancer biology; pathology; cytology and cytogenetics; mammalian genetics; human cancer biology
research; plant physiology; radiation biology; aging research. Additional courses can be developed on any subject of mutual interest to individual students and staff members. May be repeated.

5700 Developmental Biology (3) Principles of early embryogenesis and tissue interactions that initiate cellular differentiation. Emphasis on mechanisms of differential gene action and regulation of protein synthesis that are pertinent to cellular differentiation. Prereq: 5120, 5170, 5200.

5740 Statistics for Biologists (3) Application and interpretation of statistical methods in data analysis. Random variations; normal, binomial, and Poisson distributions, statistical presentation of data; estimating means and variance; confidence intervals; tests of significance for comparing samples; analysis of variance; contingency tables; chi-square tests; correlation and association; linear regression. Prereq: introductory Statistics or consent of instructor.

5750 Experimental Design in Biomedical Research (3) Requirements for a valid experiment; designs for the reduction of error, including paired comparisons, randomized blocks, and Latin squares; use of supplementary observations to reduce errors; randomization; investigating several variables simultaneously by factorial and fractional factorial experiments; determining the number of observations. Prereq: 5740.

5830 Physical Biochemistry (3) Methods and concepts relevant to the determination of size, shape, and molecular weight of biological macromolecules. Discussion of optical activity and light scattering by macromolecules in solution. Prereq: 5070-80, 5110-20, 5140.

5840 Bioorganic Reaction Mechanisms (3) Nature of the chemical bond, nucleophilic and electrophilic reactions, molecular rearrangements, oxidation-reduction, solvolysis, protein and nucleic acid modification reagents, reactions involving proteins and nucleic acids on polymer supports.

5860 Cryobiology (3) Physical and chemical responses of cells and bacteriophage to low temperatures and ice formation. Relation of these responses to permeability, structure of semipermeable membranes, conformation of macromolecules, and the 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, and cryosurgery. Prereq: 5070-80 or equivalent, and 5190.

6000 Doctoral Research and Dissertation.

6110 Seminar in Plant Physiology (1) May be repeated. Maximum 12 hrs. S/NC only.

6120 Seminar in 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 the various areas of the biomedical sciences, including cell biology, genetics, biophysics, and biochemistry. Prereq: Consent of instructor. May be repeated. S/NC only.

6200 Nucleic Acid Chemistry (3) Chemistry of nucleotide-derived materials covering topics including alkylation, solvolysis, oxidation, reduction, polymerization, synthesis, denaturation and other structure perturbants. The reaction of nucleic acids in the above systems will be examined with emphasis on the relationship of structure and reactivity. Prereq: 5110-20. Coreq: 5080.

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. The latter will emphasize enzymes and will include approximation of substrates, covalent 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 the role of lipids in membranes, enzymic expression, and nervous tissue. The main emphasis is on lipid biochemistry of mammals, although comparative aspects, particularly the lipid pathways in bacteria and yeast are also described. Prereq: 5110-20.


6260 Advances in Animal Virus Research (3) Mechanisms of infection, replication, and maturation; alternations of host cell structure and function; host immunological responses; oncogenesis; pathogenesis; genetics; interferon. Prereq: 5110-20, 5180-90.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Emphasis on current and future research developments. Offered on the topics listed under the Special Topics Courses and can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.
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.

MAJOR
Library Science

DEGREE
M.S.L.S.

The objective of the program is to prepare responsible and competent individuals to assume a professional role in libraries and information centers. In the course of study, students are exposed to various ideas about the role of libraries and information centers in society and the processes by which knowledge is communicated through the medium of the graphic record. Students acquire a familiarity with the bibliography and the literature of various subject fields. They are expected to develop the ability to evaluate and use various types of print and non-print materials. Students are also introduced to current concepts of the management of library operations and services.

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 nine hours allowed for thesis credit. At least 36 hours must be taken in the GSLIS, 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, information science/technical information service, and library management.

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. Applicants are required to take the Test of English as a Foreign Language. APPLICANT REQUIREMENTS

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 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

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.

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

Arrangements made with the University of Tennessee Libraries provide a work-study plan for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students are expected to work at least 20 hours each week and to extend the period required for the degree to approximately two years.

Similar arrangements exist with some of the 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:

Associate Professors:
G. R. Purcell (Director), Ph.D. Case Western Reserve; G. E. Estes, M.L.S. Kent State.

Assistant Professors:
J. Knightly, Ph.D. Texas; W. Robinson, Ph.D. Illinois; G. M. Sinkankas, Ph.D. Pittsburgh; P. Wilson, Ph.D. Michigan.

Courses

4100 Libraries and Librarianship (3) Historical development of libraries in society and their role and significance in the twentieth century: career aspects of librarianship; professional ethics and associations.

4150 School Library Administration (3) Objectives, functions, and place of the 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 I (6) Acquisitions, cataloging and maintenance of library collections.

4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries.
5710 Introduction to Information Science (3) Survey of the content and method of information science with emphasis on the application of research findings to general library practice.

5720 Information Systems Analysis and Design (3) Elements involved in the design and operation of information retrieval systems, including acquisition, indexing vocabularies, information representation, file organization, search procedures, and system evaluation.

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing the performance of systems to arrive at generalizations with respect to the theory, design and operation of IR systems.

5740 Information Processing on Computers (3) Use of the computer as a tool for information handling in information retrieval systems; basic understanding of programming and systems design with applications to IR systems; utilization of this understanding in practical problem solving.

5999 Practicum (6 or 9 or 12) An opportunity to translate library theory into practice under the guidance of qualified librarians. Prereq: Completion of the 21-hour core curriculum plus approval of the director.
Graduate School of Planning

J. A. Spencer, Director

MAJOR
Planning

DEGREE
M.S.P.

The Graduate School of Planning offers a two-year graduate course leading to a degree of Master of Science in 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, geography, sociology, and economics. Students in the latter quarters of the first year, and in the second year, are permitted to pursue particular interests through the choice of electives approved by the Graduate School of Planning.

Practice in research and analysis on a particular planning problem or topic is obtained through the preparation of an individual thesis or through the thesis 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.

Applications will be acknowledged upon receipt. The applications will then be held by and reviewed in the Graduate School of Planning. The applicant should not anticipate an immediate response in regard to admissibility. All applications will be held until mid-April. Recommendations will then be made to the Graduate Office regarding the applicant's admission status. The Graduate School will then notify the applicants whether they have been admitted to the University and under what conditions the admission has been made.

All inquiries concerning admission should be addressed to:

Director
Graduate School of Planning
The University of Tennessee
Knoxville, Tennessee 37916

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit including at least 36 hours at the 5000 level or above.

Each student will be required to prepare a thesis (9 hours), except that any student who:

1. Has demonstrated an understanding of and ability to carry out independent research as evidenced by having a B+ grade or above in Research Methods II, and

2. Has a 3.5 grade point average or above after completing the first 36 hours (including 21 hours in planning)
may be permitted to select nine hours in a special concentration area in order to begin development of a specialty in lieu of a thesis. The student electing the non-thesis alternative shall submit a justification statement regarding the proposed courses to the G.S.P. faculty for their approval prior to taking the courses. In addition to the normal course work involved in the courses, the student must write a major paper drawing from and integrating the content of the courses, and submit it to a faculty member designated by the G.S.P. faculty. Approval of the major paper shall be a prerequisite for graduation.

Students in the Graduate School of Planning will be 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 will be taken into account in advising students concerning the study program they should undertake during the balance of their academic program to remove any indicated deficiencies.

Each student will be encouraged, but not required, to complete a work internship equivalent to at least two and one-half months of full-time work in a planning agency at approximately the mid-point in course work.

Faculty
Professors:

Associate Professors:

Assistant Professors:
G. E. Bowen, M.A. George Washington; Judith G. Stoloff, M.U.P. Hunter; Rebecca M. Dickenson, M.A. UCLA.

Courses
4100 Introduction to Planning (3) History of planning, familiarization with the operations of contemporary planning, the concept of systems, current trends and issues. Emphasis on the relationship between planning and the society in which it occurs.

4200 Planning Communications (1) Graphical, oral and written communication of information and recommendations.

5000 Thesis

5100 Theory of Planning (4) Analysis of the means and objectives of the planning process. Emphasis on the role of the planner and the planning function in public decision making. Prereq: 4100.

5130 Planning Research Methods I (3) Research techniques in subject areas associated with city and regional planning. Research tools, data collection, analysis and projection, as well as specific techniques for planning and decision making. Coreq: 4100 or consent of instructor. (Same as Water Resources Development 5130.)

5135 Planning Research Methods II (3) Application of rigorous investigation techniques in solving planning problems, including the use of statistical analysis and mathematical models. Urban and regional information systems as a resource and tool in problem identification and solution. Prereq: 5130.

5160 Planning and Utilities (3) (Same as Environmental Engineering 5160.)

5230 Urban and Site Design (2) Principles of design of small areas such as residential subdivisions, shopping centers, institutional complexes, central business districts. Brief examination of the problems of reviewing alternative designs against each other, written, regulations. Extensive laboratory experience. Fees. 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: 5130.

5300 Regional Planning (3) Making the planning process operative in an intergovernmental context. Theories of regions and analysis of metropolitan area, regional plans, planning by states, single-purpose agency planning, and the TVA. Prereq: 5100.

5310 State Planning (3) Evolution of the planning function in state government, with emphasis on the institutional environment in which planning occurs. Context and scope of state planning, and the relationships with other branches and levels of government. Prereq: 5100.


5350 Urban Spatial Structure (2) An examination of past, present, and possible future patterns of urban spatial structure as determined by changing technology, interaction patterns, and socioeconomic environment, drawing on contemporary theories, models, empirical research. Prereq: Consent of instructor.

5360 New Towns (2) Historical development of planned new towns and implications for a national urbanization policy in the United States; the process by which new towns are being created, from the establishment of objectives to administration of the development process and the provision of public services; organizational alternatives for new town planning, development and management in the context of past experience and future objectives. Prereq: 4100, and consent of instructor.

5380 Housing (2) The nature and the demand for housing in the U.S. and abroad with emphasis on the U.S. experience. The private market processes and public influences. The problems of change in the housing supply, impact of new technology, and governmental programs designed to improve the supply and quality of housing are emphasized. Coreq: 4100 or consent of the instructor.

5410-20-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. These courses may be repeated for credit. Prereq: Consent of instructor.


5450 Urban Renewal (2) The use of urban renewal as a device for rebuilding the central city. Programming in relation to the general plan and budget. Familiarization with techniques and procedures as necessary to gain insight into major problem areas. Prereq: 4100.

5500 Synthesis (9) Problem-oriented experience designed to integrate knowledge from previous courses. Interrelationships will be stressed and the student will be required to use judgment in evaluation and creation of plans and policies addressed to real world situations. Extensive laboratory experience. Fees. Prereq: 5540.

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, etc.). Prereq: Consent of instructor. (Same as Social Work 5670.)
The University of Tennessee School of Social Work is a fully accredited two-year graduate professional school, with a program (thesis or non-thesis option) leading to the degree of Master of Science in Social Work. The full two-year curriculum is offered in all three branch locations.

**GRADUATE PROFESSIONAL EDUCATION**

The goal of graduate professional social work education is the education and training of personnel for leadership roles in the social welfare community and in the social work profession. Leadership roles include those in social welfare management and administration, social planning, social policy development, and research. Social treatment leadership roles include treatment team leaders, consultants, supervisors, and expert practitioners.

In order to help reduce and eliminate such basic social problems as poverty, racism, crime, social injustice, and ill health, both educational and social welfare service organizations must focus on preventive as well as restorative objectives and functions.

The School of Social Work's curriculum provides a core program and two areas of specialization: social treatment, and social welfare administration and planning. The two-year or six-quarter program is designed to provide the student with the basic components of professional competence through a progression of course work and supervised practice experience.

At the core of professional practice is the individual's capacity for self-awareness and self-discipline and his commitment to the values and goals of the profession. He must be able to think independently and analytically in order to use his skills and knowledge for purposeful and effective intervention at all societal levels.

**THE PROFESSIONAL CURRICULUM**

The curriculum offered during the first two quarters of the first year, the Core Curriculum, is required for all students. This Core Curriculum is designed to provide students with knowledge and skills that are common to social work practice at the social treatment and at the administration and planning levels of intervention. The Core Curriculum also provides students in social treatment with knowledge and skill about administration and planning and vice versa. The Core Curriculum is composed of the following units:

1. Human Behavior and Social Environment
2. Social Welfare Policy and Services
3. Research
4. Social Work Practice
5. Field Instruction

Human Behavior and Social Environment courses focus on community structure and process, systems theory, culture and ethnicity, role theory, small group theory, personality theory, the family, and social deviance. The Social Welfare Policy and Services courses focus on the social work profession's interest in the analysis and formulation of contemporary social policy, and the analysis of organizations that implement policy and deliver services. The Research courses focus on methodology as applied to problems in social welfare. Social Work Practice courses, which may include a skills laboratory, focus on interviewing, formulating objectives, observing and reporting behavior, managing group discussion, and other practice skills.

Field Instruction is a practicum that provides students with practice experience in a social welfare agency or program.

At the beginning of the third quarter of the first year, the student selects a specialization—Social Treatment or Administration and Planning. Students are required to take 12 credit-hours in their specialization. Students may take electives in the other specialization. The first-year curriculum is on a concurrent class and field plan, with students participating in the classroom study program two or three days per week and spending two days in field instruction in a social welfare agency.

In the second year, students are involved full-time in classroom courses during the Fall Quarter, and a block field placement in the Winter and Spring Quarters with at least one concurrent classroom course per quarter.

The availability of second-year field placements in social agencies in principal cities in Tennessee and in areas immediately adjacent to the state enables the student to have some choice as to field instruction assignments.

The School of Social Work recognizes and accepts the cultural pluralism of society and seeks to prepare the student for practice through the planned inclusion of significant and pertinent racial and ethnic content throughout the curriculum. Such knowledge and its application should provide the student with the educational background to take a creative and objective role in the efforts of the social work profession toward the elimination of racism, poverty, and other social ills.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, P.O. Box 8820, Knoxville, Tennessee 37916.
ACCELERATED PROGRAM

The University of Tennessee School of Social Work has a special accelerated program which enables eligible candidates to complete the MSSW degree in twelve consecutive months. The 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 UTSSW faculty.

The twelve-month program begins in June with an intensive ten-week term from which students proceed in the Fall into the regular second-year curriculum. Application for admission to the Accelerated Program is through the regular admissions process.

GENERAL REQUIREMENTS FOR ADMISSION

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 falling below the average to be admitted on supplemental evidence of ability to perform at a satisfactory level.
3. Personal qualifications acceptable for entrance into the professional practice of social work.

Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences.

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.
7. The minimum number of credit hours required for a degree shall be 79 hours.

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 that he wishes to begin with 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 course work must be completed within the six-year period prior to the receipt of the degree. In addition, Pass/Fail 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.

The Core Curriculum

The core curriculum is essentially the same for all students.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5070</td>
<td>Social Work Research I</td>
<td>3</td>
</tr>
<tr>
<td>5110</td>
<td>Social Welfare Policy and Services I</td>
<td>3</td>
</tr>
<tr>
<td>5210</td>
<td>Human Behavior and Social Environment I</td>
<td>3</td>
</tr>
<tr>
<td>5410</td>
<td>Social Work Practice I</td>
<td>3</td>
</tr>
<tr>
<td>5910</td>
<td>Field Practice</td>
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</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5080</td>
<td>Social Work Research II</td>
<td>2</td>
</tr>
<tr>
<td>5120</td>
<td>Social Welfare Policy and Services II</td>
<td>3</td>
</tr>
<tr>
<td>5220</td>
<td>Human Behavior and Social Environment II</td>
<td>3</td>
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<tr>
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<td>Social Work Practice II</td>
<td>3</td>
</tr>
<tr>
<td>5920</td>
<td>Field Practice</td>
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</tr>
<tr>
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<td>TOTAL QUARTER HOURS</td>
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</table>

The Specialization

The curriculum outlined below for the Spring Quarter, first year, and for the second year shows typical programs for students after they have completed the Core Curriculum. A student may earn nine hours of elective credit through completion of a master's thesis.

Spring Quarter, First Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>5930</td>
<td>Field Practice</td>
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<tr>
<td>5940</td>
<td>Specialization Courses Electives</td>
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Fall Quarter, Second Year

<table>
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<td>5950</td>
<td>Field Practice</td>
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<td>5961</td>
<td>Integrative Seminar</td>
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<tr>
<td>One Elective</td>
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<tr>
<td></td>
<td>TOTAL QUARTER HOURS</td>
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Spring Quarter, Second Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>5970</td>
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<td>TOTAL QUARTER HOURS</td>
<td>12 or 13</td>
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</tbody>
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AREAS OF SPECIALIZATION

A specialization is a focus within the student's program involving intensive study, through class and field instruction. The University of Tennessee School of Social Work offers specializations in the following areas:

Social Treatment

Social 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 varied individual, family, and group methods applicable in the social treatment of diverse client problems.

Social Work Administration and Planning

Social work administration and planning deals with the design, implementation, and continued operation of effective programs for client service. Specifically, the method deals with: assessment of client characteristics, development of environmental resources, design of effective organizational structures, management, staff development, program evaluation, social planning, neighborhood and community development, financing, and coordination of services.

Preparations for Fields of Practice

Within the curriculum specializations described above, the School offers opportunities for preparation for careers in fields of social work practice such as the following: Corrections, including work with children and adults in courts, correctional institutions, and in probation and parole; Family and child welfare services in public and voluntary agencies; Group services in neighborhood and community centers; Health services, including work with individuals and groups.
in programs of health and medical care in public health departments, hospitals, and clinics; Mental retardation, including work with individuals and groups in clinics, schools, and hospitals; Public welfare services, including economic assistance and family services; Mental health services, work with individuals and groups in mental health programs including comprehensive mental health clinics, traditionally oriented psychiatric clinics, and hospitals; Rehabilitation services in a variety of settings to individuals with medical, psychiatric, and social disabilities; School social work with children and their families concerning school-related problems; Social gerontology, individual and group services to the aging in a variety of settings.

Faculty

Professors:
Mary H. Bloch, M.A.S.A.; Robert C. Bonovich, D.S.W.; Gideon W. Fried, Ph.D.; Ben P. Granger, Ph.D.; Bernice E. Orchard, M.S.S.A. (Emeritus); Sue W. Spencer, M.S. (Emeritus).

Associate Professors:

Assistant Professors:
Josephine A. Allen, M.S.W.; William J. Bell, M.S.W.; Paul Campbell, M.S.S.W.; Jenny G. Collier, M.S.W.; James M. Crouchorn, Jr., D.P.A.; Irving F. Faust, Jr., M.S.W.; Anne R. Forrester, M.S.W.; Ronald K. Green, M.S.; Hisashi Hirayama, D.S.W.; Dong Soo Kim, M.S.W.; Nancy L. Lohmann, Ph.D.; Alice E. Moses, D.S.W.; Margaret Strong, M.S.W.; Peter M. Tostes, M.S.S.W.; Stephen A. Webster, M.S.S.W.; Harriette A. Wilson, M.S.S.A.

Courses

5000 Thesis

5070 Social Work Research I (3) Examination of research methodology as applied to problems in social welfare. Consideration is given to problem formulation; development of research design; instrument construction; data collection, analysis, and presentation; and report writing.

5080 Social Work Research II (2) A continuation of Social Work Research I.

5081 Evaluative Research in Social Work (2-3) An advanced course in social welfare evaluation. Topics will include the socio-political and organizational context of evaluative research, research design, the use of qualitative and quantitative research techniques to evaluative research, and the utilization of research findings. Prereq: Completion of Core or consent of instructor.

5082 Practicum in Social Work Research (3-9) Supervised practice in social work research. Problem may be generated by faculty, students, or a social welfare agency or organization. Prereq: 5070-80 and consent of the faculty member conducting the investigation. S/NC only.

5083 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 4 hrs.

5090 Special Problems in Social Work (2-6) Individual study or research on problems of special significance to the student's program, under supervision of the major professor. May be repeated.

5110 Social Welfare Policy and Services I (3) The focus is on the interests of the social work profession in the development of contemporary social policy at the local, state, national, and international levels of organization. Examination of the contribution social work professionals can make to the formal policy making process through which macro-social change is effected, and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Program lab may be needed to focus on beginning skill development.

5120 Social Welfare Policy and Services II (3) An examination of theories of complex organizations as applied to social welfare services delivery systems. The transformation of collective social welfare resources into divisible and indivisible social welfare benefits through organized instrumental action of a professional nature.

5130 Social Policy Analysis (2-3) "Policy science" techniques are considered for their appropriateness in assessing the social, political, and economic implications of social policy programs. Prereq: Completion of core or consent of instructor.

5161 Social Welfare Seminar (2-3) A problem area or a field of practice seminar focusing on substantive knowledge about a social problem or condition and the interrelationships among problem definition, social policy, social welfare program, and social work practice. Fields such as health, mental health, child and family welfare, mental retardation, education, corrections, housing, labor force development, income maintenance, and aging may be examined. May be repeated. Maximum 9 hrs. Prereq: Completion of core or consent of instructor.

5210-20 Human Behavior and Social Environment I (2) The nature and purpose of theory as it relates to the individual, family and small group within the context of their functions, structures, roles and processes. Behavior of these systems is conceptualized along functional-dysfunctional and normal-deviant continuum. Organizing themes are stress, development and maturation, adaptive and defensive mechanisms. An open system approach is used to understand the interrelationship of biological, psychological, and social variables. Prereq: Completion of core or consent of instructor.

5290 Special Accelerated Program in Social Work (15) A ten-week program providing qualified students with an intensive academic and field practice experience that qualifies them to enter into the second year of graduate study upon successful completion of this term. S/NC only.

5310 Human Behavior and Social Environment (2) Deepens and extends the student's knowledge of the range of adaptive behavior; contributes to behavior from optimum social functioning through pathology. Prereq: Second-year status may be repeated.

5311 Imaginative Perspectives on the Human Condition (2) Examination of the usefulness to social work students of prose, drama, and poetry, which may illuminate and expand the knowledge and appreciation of every person's humanness. Adaptive and maladaptive response to ordinary and extraordinary life situations and events, as portrayed by creative writers, are considered. The expressive powers of the molding of the human personality and spirit through the interaction of persons with one another and with society are analyzed. Prereq: Completion of core or consent of the instructor.

5312 Psychopathology and Social Deviance (2-3) Deals with theories and recent research in the etiology of psychic dysfunction and social variance. The categorical approach to psychopathology will be examined and differentiated from other approaches to human behavior. Prereq: Completion of core or consent of instructor.

5313 Deviant Behavior of Children and Youth (2-3) An examination of deviant behavior and conduct disorders in children and youth, the etiology, symptomatology, and the range of social services and treatment modalities. Prereq: Completion of core or consent of instructor.

5314 Comparative Theories of Personality (2-3) Examines those personality theories with the most relevance to practice with individuals, groups, or families. Prereq: Completion of core or consent of instructor. Taught at branches only. Available UTK as Psychology 4510.

5315 Human Sexual Problems (2-3) Desensitization and desensitization of personal and social attitudes toward sexual behavior, clinical problems and approaches designed to help sex workers better able to deal with sexual problems. Prereq: Completion of core or consent of instructor.

5316 Mental Health and Employment (2-3) Explores work as a major life task and value, attitudes toward work, work as a stressor, effect of changing technologies on individuals and communities, interdependence of individual and organization, meaning of work in assessing mental health. Prereq: Completion of core or consent of instructor.

5410 Social Work Practice I (3) Basic theory, values and beginning skills development general to social work intervention at various system levels. Combines classroom and skills laboratory experiences.

5420 Social Work Practice II (3) Assessment, planning, methodology and skills development fundamental to social work intervention. Combines classroom and skills laboratory experiences.

5440 Family Therapy in Social Work Practice (2-3) Application of practice theory designed to assist in the acquisition of skills in the treatment of the family as a unit. Prereq: Completion of core or consent of instructor.

5441 Transactional Analysis (2-3) The philosophy, theory, and therapeutic technique of transactional analysis. Lectures, discussion, and experiential methods facilitate acquisition of the knowledge and skills to use transactional analysis as a treatment modality. Prereq: Completion of core or consent of instructor.

5442 Short-Term Treatment (2-3) Considers the theory and practice of short-term treatment focusing on the nature of methods, characteristics of clients responsive to this approach, and designs of programs providing short-term treatment services. Specific techniques of assessment and treatment applied to groups with individual emphasis. Prereq: Completion of core or consent of instructor.

5443 Seminar on Behavior Therapy (2-3) Behavior modification methodology as applied to diagnosis, assessment, and treatment; the role of behavior assessment interventions, skill in evaluative data on effectiveness of treatment interventions. May be repeated. Maximum 6 hrs.
544 Social Work Practice with the Poor (2-3) Examines some of the problems, issues, and dilemmas of practice in social services with the poor and considers the attributes of service-delivery systems which make that practice possible. Prereq: Completion of core or consent of instructor.

5450 Social Work Treatment with Individuals and Families (3) Draws primarily on social work literature and examines in detail social casework as a method of social work practice and as a type of interpersonal treatment. Prereq: Completion of core or consent of instructor.

5470 Contemporary Treatment Modalities: Individual and Family (2-3) Well-established and developing treatment modalities are examined in terms of their essential concepts. Emphasis on differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor.

5560 Social Work Treatment with Groups (3) Focuses on the development of knowledge and skill in the use of group methods in social work. Emphasis on process and on forming the group, structuring group tasks and experiences, understanding group functioning, enabling problem-solving, facilitating the transfer of change, and evaluating individual change and group effectiveness. Prereq: Completion of core or consent of instructor.

5561 Interpersonal Skill Development (2-3) A training group is employed to enhance interpersonal competence in the application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

5570 Comparative Methods of Group Treatment (2-3) Comparative analysis and critical review of the theory and methodology of some of the major group treatment modalities with emphasis on theory-base, leadership, techniques and procedures, and research. Prereq: Completion of core or consent of instructor.

5571 Planning and Management of Change in Social Welfare (2-3) Theories and models of change such as planned change, conflict, and evolutionary change are examined in relation to organizational change, community improvement, and economic change as these relate to social welfare services. Prereq: Completion of core or consent of instructor.

5701 Administration in Social Work (2) Introduction to administrative practice as it relates to social work purpose and values and the development of administrative principles that make possible the effective provision of welfare services.

5702 Organizational Design of Social Welfare Agencies (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. Emphasis on internship and experience for development of practical skills for coping with a variety of situations. Prereq: Second-year status; Social Work 5761 or equivalent.

5740 Supervision and Consultation in Social Work (2) Analysis of components, principles, and methods of supervision and consultation as processes in social work. Prereq: Second-year status.

5741 Supervision in Social Work (2) Dual roles of the supervisor in various settings, and supervision will be distinguished from consultation and from direct practice. Responsibility and accountability to client system, supervisee, and executive will be considered, together with problems of the middle management position of the supervisor. Differences and similarities in supervision of varying levels of personnel will be identified and analyzed. Goals, tasks, techniques, and processes in relation to individual and group supervision and field instruction. Prereq: Second-year status or consent of instructor.

5740 Consultation in Social Work (2) Constellation of roles, relationships, and behaviors required of a consultant. Consultation as distinguished from supervision, administration, and direct practice and consultation considered in relation to various settings and levels of responsibility. Processes and practices of consultation and the pitfalls of the consultant's position. Prereq: Second-year status or consent of instructor.

5743 Management of Human Resources in Social Work (2-3) Examines the performance function in administration of human services programs and agencies. Topics include personnel recruitment, placement, 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) Examines philosophies and practices of teaching and learning as they relate to educational programs in social work. Topics include: distinctions between teaching and learning; training and education; unique aspects of teaching and learning; measurement issues; models and styles of education. Prereq: Completion of core or consent of instructor.

5745 Professional Leadership in Social Work (2-3) Examination of leadership in social welfare. Consideration is given to various theories of leadership; the 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) An in-depth sequence of courses in social welfare administration and planning which examines topics significant to managerial-planner role such as decision making, budgeting, planning and staffing, and philosophical and methodological issues. Prereq: Completion of core or consent of instructor.

5762 Seminar in Social Welfare Administration and Planning (3) Designed to assist students in acquiring specific administrative and planning techniques and methodologies for social welfare delivery systems. Prereq: Completion of core or consent of instructor.

5771 Information Systems and Decision Making (2-3) Explores decision making in human service organizations, the utilization of information in policy formulation, delivery of services and evaluation of organizational performance. Information generation, collection, processing, storage, retrieval, and utilization are considered in relation to management control, evaluation, and forecasting. Prereq: Completion of core or consent of instructor.

5772 Financial Management for Social Welfare Administration (2-3) Focuses on centralized decision making related to the allocation of scarce resources among service organizations. Technical aids to budgetary choice and other aspects of financial management will be considered for the utility, parsimony, and feasibility. Prereq: Completion of core or consent of instructor.

5800 Management of Residential Settings (2-3) Issues and trends in management and programming in residential institutions for children, the aged, mentally ill, mentally retarded, juvenile and adult offenders, and other groups. Prereq: Completion of core or consent of instructor.

5812 Organizational Perspectives to Juvenile Justice (2) Aspects of the Juvenile Justice System: overview of juvenile delinquency, introduction to theories of causation, role of police in delinquency detection, prevention of delinquent offenders, police procedures, role of the juvenile court, alternatives to institutions, correctional institutions, aftercare programs, and preventive strategies. Prereq: Second-year standing.

5820 Social Aspects of Illness (2) Social, economic, and emotional problems arising from or related to illness and disability as they affect the individual, his family, and the community. Services needed to obtain optimum results from medical care. Lectures, discussion, illustrative case material.

5825 Drugs: Use and Abuse (2-3) Surveys and analyzes the physiological, psychological, and sociological factors underlying alcoholism and drug abuse, recent research and treatment innovations, and the user and his family. Prereq: Completion of core or consent of instructor.

5826 Social Work Treatment for Marital Adjustment (2-3) Focuses on theories regarding social and cultural values and personality processes which gain expression in marriage, concepts regarding contemporary marriage styles, problems in marriages, and appropriate treatment strategies. Prereq: Completion of core or consent of instructor.

5830 Law and Social Work (2-3) Basic principles of law which relate to social work practice; organization of courts; legal aid services; and the problems of a legal nature that affect social work.

5850 Social Gerontology (2-3) Physical, psychological, and social aspects of aging; economic and health status of the aging; the older person and the family; community programs for aging; retirement—phenomenon of modern society.

5865 The Roles of Women (2) Roles and statuses of women, with the emphasis on the characteristics of women in modern society. Includes a study of empirical research as well as the popular literature. Ascribed and achieved facets of women's statuses are explored.

5910-20 Field Practice (3, 4) Instruction and supervised practice in social work with individuals, groups and communities. Prereq: Admission to the School; 5410 concurrently prior to 5910; 5410 is a prerequisite for 5920; 5910 is a prerequisite for 5920. Required course. S/N only.

5930-40 Field Practice (4, 5) Specialized instruction and supervised practice in methods of social work intervention, evaluation, and planning in community health and welfare programs and agencies. Prereq: Admission to the School. To be taken in sequence. S/N only.
5961 Integrative Seminar (2) Required seminar facilitates integration of the two year MSSW program; attention is given to current issues in the profession and to pressing social problems. Student participation in symposia, discussions, simulations, and gaming situations prepares the graduating student to assume positions of responsibility and leadership within the profession. The graduating student is helped to plan toward continuing his 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.

5980 Practicum in Governmental Social Welfare Policy Making (2-3) Practical introduction to the process of legislative and/or administrative policy making at the state or local governmental level, through assignment of students to the offices of elected or appointed proximate policy makers. Limited social welfare policy research activities. Seminar used to present normative and descriptive theory about the public-making process, and models of policy analysis. May be repeated. Prereq: Social Work 5110 and consent of instructor.
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