6119 Advanced Instrumentation in Speech and Hearing Science (3) Selection, use, and calibration of instrumentation used in speech and hearing research. Prereq: 5117, 5119 or equivalent. W, A

6500 Advanced Seminar in Audiology (3) Prereq: Consent of instructor. May be repeated. Sp, A

6520 Advanced Seminar in Speech and Language (3) Topics vary from quarter to quarter but include advanced study of aberrations of voice, articulation, speech perception, language development or use, and language symbolization. Prereq: Consent of instructor. May be repeated. F, Sp, Su

6560 Directed Research (1-6) Participation in ongoing or non-dissertation research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

6570 Directed Study in Speech Pathology (1-3) May be repeated. Maximum 9 hrs. E

6580 Directed Study in Audiology (1-3) May be repeated. Maximum 9 hrs. E

6600 Directed Study in Speech Science (1-3) May be repeated. Maximum 9 hrs. E

Biochemistry

MAJOR DEGREES

Biochemistry M.S., Ph.D.

Professors: K. J. Monty (Acting Head), Ph.D. Rochester; J. E. Churchich, Ph.D. Sheffield (England); T. P. Salo (Associate Head), Ph.D. Michigan.

Associate Professors: L. Redd, Ph.D. Chicago; J. G. Joshi, Ph.D. Poona (India).

Assistant Professors: L. B. Brattsten, Ph.D. Illinois; R. Bryant, Ph.D. Illinois; W. Feinberg, Ph.D. California (Berkeley); L. Huang, Ph.D. Michigan State.

The graduate program consists of an orientation examination to determine the most suitable course work for the incoming graduate student, successful completion of a series of graduate courses and seminars, and a qualifying examination at the end of the first year. In addition, the Ph.D. degree requires research leading to the writing and oral defense of a thesis, while the Ph.D. degree requires successful completion of preliminary examinations, and extensive research leading to the Ph.D. dissertation and its oral defense.

The orientation examination: Given fall quarter at 9:00 a.m. on the Thursday prior to the week in which classes begin, is taken by all incoming students without exception. The purpose of the examination is to aid in placing students in the proper courses to help ensure their success in the graduate programs. The examination will cover analytical, organic, and physical chemistry. If the student's undergraduate program does not show appropriate courses in one of the subjects, the student will not take that part of the examination but will be enrolled in a suitable course. The results of the examination will help determine appropriate course work.

The qualifying examination: At the conclusion of the first year's work in 5510-20-30, 5310-20-30 and 4230, a comprehensive qualifying examination covering all of the material will be taken by all first year graduate students, with the exception, in the first week of the summer quarter. On the basis of results of the examination, the student will be counseled concerning his/her future in the biochemistry program.

THE MASTER'S PROGRAM

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

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

1. Introductory Organic Chemistry laboratory (at least one quarter of analytical chemistry), and a minimum of three quarters of approved physical chemistry.

2. A minimum of 12 quarter hours of approved biology courses beyond the introductory level, including at least 3 hours of genetics and 3 hours of physiology.

3. An orientation examination as described above.

4. Biochemistry 5510-20-30, 5310-20-30, 4230; and at least one special topics course (5450), or 5610 or 5110 or 5120 or 5130 or 5210.

5. A qualifying examination as described above.

6. At least 9 hours of advanced lecture-seminar courses from the following: Biochemistry 6410, 6010.

7. At least 9 hours of Master's research and a thesis.

8. A final comprehensive examination which will cover both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

An incoming student must present course work covered by an undergraduate major in either chemistry or biology. Departmental requirements for the awarding of the Ph.D. include mastery of the subject matter indicated in the following list of courses. Course contents listed in Items 1 and 3 are prerequisites to taking preliminary examinations; applicants usually should expect to complete these requirements within the first two years of graduate school.

1. Introductory Organic Chemistry with laboratory (at least 1 year), at least one quarter of analytical chemistry, Chemistry 4510, Introductory Physics*, Differential and Integral Calculus at least one year*, at least three quarters of approved graduate courses in chemistry or physics, for example: Chemistry 5110-20-30-35, Chemistry 5340, Physics 5210-20-30, Physics 5440, Physics 5510-20-30; plus minimum of three quarters

*Though completion of these courses or the equivalent is required, they may not be taken for graduate credit.
of approved physical chemistry (Biochemistry 4110-20 or Chemistry 4105-20, or Biochemistry 4230, or Chemistry 3410-20-30) and at least 18 hours of biology beyond the introductory level including at least 3 hours of genetics and 3 hours of plant and/or animal physiology. The graduate credit in an approved area of specialization which should be identified early so that necessary prerequisites can be taken.

2. Orientation examination.


4. In addition to the course(s) listed in item 3 above, four courses selected from those numbered 5110 or higher, excluding 5300 or 5640.

5. Qualifying examination.

6. Participation in Biochemistry 6410 and in the advanced biochemistry seminars 6010 during the entire period of residence.

7. Preliminary Examination: Students who pass the comprehensive qualifying examination with sufficiently high marks and those who complete a mandatory M.S. degree (required prior to the preliminary examination) will have completed the preliminary examination, at a time of a format compatible with Graduate School requirements as determined by the student's committee.

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

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

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

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

b. The preparation of a research manuscript suitable for submission for publication in a major scientific journal.

c. The oral defense of that manuscript before a committee consisting of three faculty members appointed by the head of the department, at least two of whom shall be members of the department.

4110-20 Cellular and Comparative Biochemistry (4, 4) Electrophoretic procedure; chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture; synthetic metabolism; nucleic acid function, protein synthesis and biochemical genetics; regulation of biological processes. Must be taken in sequence. Prereq: Chemistry 2110-2119, 2120-2129, and 1 course from Biology 1210-20-30 or Botany 1110-20, 3 lectures and discussion. F, W, Sp; W, Sp; Su

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

4210-20 Introduction to Physical Biochemistry (3, 3) 4210—Introduction to thermodynamics, phase stability and chemical potential; cosmic pressure; activity and the Debye-Hückel model; electrolythrochemistry; membrane permeability. 4220—Elements of statistical mechanics, diffusion, collision theory; chemical kinetics and transition state theory; rates and activation; specialized kinetics of enzymatic processes; some biopolymer considerations. Prereq: Mathematics 1840-50-60, Chemistry 3211-21-31 and 3219-29-39, and an introductory course in biology. F, W

4230 Introduction to Physical Biochemistry (3) Physical characterization of macromolecules; polarization light, absorption and fluorescence, sedimentation and transport hydrodynamics, electrohydrostatic methods, and x-ray crystallography of proteins and nucleic acids. Prereq: 4220 or Chemistry 3430, or equivalent. Sp

5000 Thesis (1-15) E

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


5120 Biochemistry of Mitochondria and Selected Organelles (3) Organization of compartmental metabolic systems in mitochondria and other cell organelles. Supramolecular organization, bioenergetics, transport systems, drug metabolism, oxygen toxicity and defense mechanisms, nitrogen fixation and photosynthesis. Emphasis on experimental approaches. Prereq: 4120 or 5510 or equivalent.

5130 Protein Structure and Enzyme Function (3) Physicochemical properties of proteins; primary, secondary, quaternary, and tertiary structures; denaturation, renaturation and other conformational change; structure-function correlations; conformational analysis of catalysis; stoichiometry, stability, transient, relaxation, and allosteric kinetics of catalysis. Prereq: 4110 and either 4220 or Chemistry 3430.

5210 Structure and Function of Biological Membranes (1) Structural organization of biological membrane components. Dynamic properties as studied biochemically and biophysically. Selective topics of membrane structures related to structural organization.

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

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

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

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

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

5510 Properties of Biomolecules Related to Function (3) Structures, chemical and physical properties of biomolecules developed from theoretical and experimental points of view to explain actions and interactions. Prereq: Chemistry 3211-21-31, Chemistry 2140 recommended. Prereq or coreq: 4110, Chemistry 4910 or equivalent. F

5520 Molecular and Cellular Basis of Metabolic Regulation (3) Regulation of metabolic pathways dependent on energy demands of organism and on biochemical and environmental factors. Prereq: 4110 or consent of department. Coreq: 4220 or Chemistry 4920 or equivalent. W


5610 Environmental Toxicology (3) Basic concepts in toxicology, interactions at subcellular, cellular, organ, organismal, population, and environmental levels, legal aspects. Major emphasis on biochemical toxicology. Prereq: 4110-20, Chemistry 3211-21-31, Chemistry 4910-20-30, or consent of instructor. (Same as Ecology 5610.) W

5640 Techniques in Environmental Toxicology (2) Survey of experimental techniques for assessment of presence, toxicity, and impacts of pollutants in environmental systems. Laboratory exercises focus on analytical, biochemical, and bioassay methods employed in toxicological studies. Prereq: Chemistry 4100-2149 and 3211-21-31 of yr. of physics or consent of instructor. (Same as Ecology 5640.) Sp

6000 Doctoral Research and Dissertation (3-15) E

6010 Advanced Biochemistry Seminar (1) Topics to be covered posted in spring quarter for following year. Invited speakers of note will participate. May be repeated. Maximum 9 hrs. S/NC only. F, W, Sp

6420 Current Topics in Biochemistry (1) Seminars and lectures dealing with current advances in field of biological chemistry. May be repeated with consent of department. S/NC only, F, W, Sp

6431 Current Topics in Environmental Toxicology (1) Critical review of research problems and methods in environmental toxicology: behavioral toxicology, biochemical and ecological effects, biostatistics and epidemiology. Presentations by students, faculty and guest lecturers from academia and industry. May be repeated with consent of department. Maximum 6 hrs. (Same as Ecology 6431.) S/NC only, F, W, Sp

6450 Advanced Special Topics (1-3) Registration only by prior arrangement with department. For students who have passed Ph.D. preliminary examination or are in advanced stage of graduate studies. Topic title posted in advance. May be repeated. Maximum 9 hrs.

Biology

MAJOR

DEGREE

MACT

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

1. Bachelor's degree with satisfactory record.

2. Nine quarter hours of college mathematics.

3. Twelve quarter hours of physical sciences.

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

5. Eighteen quarter hours of advanced biology courses.

Requirements for the degree:

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

1. Eight quarter hours in each of the following:
   a. Taxonomy and/or Ecology.
   b. Morphology, Developmental Biology and Anatomy.
   c. Physiology and/or Biochemistry.
   d. Genetics, Cytology and/or Cyto genetics.
   e. Eighteen quarter hours of graduate credit in each of the following fields: biochemistry, botany, microbiology, ...
zology or 36 quarter hours of graduate credit among the four fields as specified by the interdepartmental committee administering the MACT program in Biology.

3. At least 21 quarter hours of course work in requirement 2 (not including special projects and thesis) numbered at the 5000 or 6000 level.

4. At least 9 quarter hours of Master's research and an acceptable thesis.

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

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

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

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

### Botany

**MAJOR: Botany**

- **Botany Degrees:** M.S., Ph.D.

**Professors:**
- R. W. Holton (Head), Ph.D. Michigan.
- Ph.D. Ohio State, Ph.D. Michigan.
- W. C. Vandebilt, L. W. Jones, Ph.D. Texas.
- J. R. McConkey, Ph.D. Emory F. H. Norris.
- Ph.D. Ohio State, Ph.D. Illinois, Ph.D. Chicago.
- R. H. Petersen, Ph.D. Columbia; A. J. Sharp.
- Ph.D. Ohio State: P. L. Weine, Ph.D. Texas.

**Associate Professors:**
- C. C. Amundsen, Ph.D. Colorado, J. D. Caponetti.
- Ph.D. Harvard; A. M. Evans, Ph.D. Michigan.
- A. S. Heilman, Ph.D. Ohio State; R. R. Hinke.
- Ph.D. Miami (Ohio); K. H. Hughes, Ph.D.
- Utah; O. J. Schwarz, Ph.D. North Carolina State; H. H. Shugart, Ph.D. Georgia.

**Assistant Professors:**
- L. G. Hickok, Ph.D. Massachusetts; B. Mullin.
- Ph.D. North Carolina State; E. E. Schilling, Ph.D.
- Indiana; D. K. Smith, Ph.D. Tennessee.
- W. O. Smith, Ph.D. Duke.

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, bryology, cytology, cytogenetics, ecology, genetics, ichnology, morphology, mycology, phycology, physiology, phytology, pteridology, and taxonomy.

**Requirements for admission:** In addition to the general Graduate School requirements (see page 11) the botany department also strongly recommends submitting aptitude and advanced scores from the Graduate Record Examination, at least three letters of recommendation from academic or professional persons, a short statement describing probable areas of interest in botany, and the following specific courses:

1. General botany or biology, 12 quarter hours.
2. Advanced botany or comparable biological sciences, 18 quarter hours.
3. Physical sciences; general inorganic chemistry, 12 quarter hours.
4. College mathematics, 9 quarter hours.

**General degree requirements** are given on pages 8-9. Special departmental requirements include successful completion of the following.

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*Comparative Animal Research Laboratory, Oak Ridge.*

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THE MASTER'S PROGRAM

**A. Thesis Program**

1. Satisfactory preparation of a written formulation and oral defense to the student's committee of a research proposal suitable for a thesis program. Must be completed before enrollment in Botany 5000.
2. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030 (can also be applied to the doctoral program).
3. Satisfactory completion of 2 credit hours at the 6000 level.
5. Presentation of a thirty-minute departmental seminar.
6. Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

**B. Non-Thesis Program**

1. Satisfactory completion of 51 quarter hours of approved graduate courses of which 30 quarter hours must be in botany including Botany 5003 and 5004.
2. Satisfactory completion of 2 credit hours at the 6000 level.
3. Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

**THE DOCTORAL PROGRAM**

1. Satisfactory presentation of a written formulation and oral defense to the student's committee of a research proposal suitable for a dissertation program. Must be completed before enrollment in Botany 6000.
2. Satisfactory performance on a written comprehensive preliminary examination.
3. Presentation of one or more cognate areas outside of the department totaling 9 graduate credit hours with at least a B average.
4. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030.
5. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation).
7. Presentation of a one-hour departmental seminar near the end of the doctoral program.
8. Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

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

**3010-20 Plants in Evolution**

1. Monera to angiospermae; emphasis on evolutionary relationship.
4075 Botanical Photography (3) Photography of natural history subjects and achievement of technical and aesthetic skills and use of appropriate lighting techniques for class, seminar or public lecture. Landscape, habitat, close-up and small object photography, in color, using 35 mm format. Limited shared equipment available. Students encouraged to use own equipment. Film and processing costs paid by student. Photos processed and critiqued in class. Prereq: 6 hrs of botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A.

4080 Field Pteridology (3) Field experience on identification of ferns and fern allies in the laboratory, close-up and small object techniques, field identification of ferns and habitats, laboratory sessions. Prereq: 6 hrs of botany. Recommended prereq: Botany 3010-20 or equivalent. Su, A.


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

4310 Plant Ecology (4) Interactions between individuals, species, communities and their environment. Circulation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and periods of independent study outside of class. Prereq: 3303 or equivalent. F, A, Sp, Su, A.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for students not entitled to graduate status, registered during any quarter when such a student uses university facilities and/or faculty time before degree completion. Approval of the department for the degree requirement. May be repeated. S/N only. E

5003-04 Non-Thesis Research (3, 3) Library, field, or laboratory research under supervision of staff member. Not for thesis candidates. May be repeated. S/NC only. E

5001-02 Non-Thesis Graduation Completion (3-15) E

5070 Principles of Biological Illustration (3) Principles and application of photography, including photomicrography and photomicrographic techniques, for recording and presentation for research and publication of data in pictorial or graphic form. 1 hr and 2 labs. W

5090 Morphology and Evolution of the Phycocyanophyta (4) Evolutionary study of selected genera of Cyanophyta. Prereq: 3000 or equivalent. 2 hrs and 2 labs. W

5106 Phytoplankton Ecology (4) Interaction between environment and phytoplankton. Nutrient uptake, primary production, competition, ecological theory applied to phytoplankton communities, and physiological adaptations by populations to environmental conditions. Prereq: 3010 or 4117. Recommended prereq: 5061 or equivalent. 1 hr and 3 labs. W

5131 Vascular Plant Taxonomy (4) Family characteristics of vascular plants, including principles of phylogenetic and classification, based primarily on plant morphology. Prereq: 3000 or equivalent. 2 hrs and 2 labs. W

5150 Advanced Morphology of Flowering Plants (4) Morphology and differentiation of plants at molecular, cellular and developmental levels. Prereq: 3020-30 or 4120; 3210 or consent of instructor. Sp, A.

5160 Biosystematics (4) Major experimental methods used in systematic and evolutionary biology. Prereq: 3000-30 or 4120; 3210 or consent of instructor. Sp, A.

5180 Plant Taxonomy I (3) Plant cell, tissue, and organ structure and function, with emphasis on correlation where possible of ultrastructural, biochemical and functional aspects of cell metabolism, and different levels of organization. Prereq: 3010 or equivalent. F, A.

5200 Advanced Plant Physiology (3) Plant physiology, response of plants to light: photosynthesis, chemotropism, and photoregulated growth. Prereq: 3070 or Consent of instructor. 2 hrs and 2 labs. W

5235 Advanced Plant Taxonomy I (3) Morphology and differentiation of plants at molecular, cellular and organismal levels. Prereq: 3020-30 or 4120; 3210 or consent of instructor. 2 hrs and 2 labs. F, A.

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

5310-20-30 Special Problems in Botany (1-6, 1-6, 1-6)

5340 Plant Geography (4) Distribution of ecosystems with emphasis on American types. Vegetation, climatic and historical aspects. Prereq: 4310. 2 hrs and 2 labs. W

5350 Analysis of Plant Communities (4) Plants as species and ecosystems considered from standpoint of geology, ordination, and ecosystem function. Prereq: 4310. 2 hrs and 2 labs. W

5360 Marine Ecology (4) (Same as Zoology 5360.)


5420 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botany. May be repeated. Maximum 12 hrs. S/N only. E


5780 Plant Cytochemistry (4) Intensive consideration of cellular and subcellular processes and functions, with emphasis on correlation where possible of ultrastructural, biochemical and function of subcellular organelles. Principles and application of various analytical and electron microscopic techniques: cell fractionation and isolation of subcellular components; differentiation and analytical centrifugation: photomicrography and microcinematography. Intended for graduate students in the biological sciences. 2 hrs and 2 labs. F, A.

5810 Cytogenetics (4) Chromosome structure and behavior during mitotic and meiotic divisions in relation to development, evolution, hybridization, speciation, and polyplody. Laboratory emphasis on normal and aberrant meiotic systems and their identification from plants and animals. Prereq: Biology 3110 and at least 6 additional hrs in biological sciences. Sp.

5820-21-22-23-24 Methods and Instrumentation in Laboratory Investigation (1, 1, 1, 1, 1) Laboratory course providing project experience and theoretical background in various research methods: ion-exchange, resins, adsorption spectrometry, disc electrophoresis, polarography, zonal and ultracentrifugation, gas chromatography, automatic analyzers, gel electrophoresis, and detection methods. May be repeated with consent of instructor. S/N only. E

5830 Field Methods in Plant Physiology (4) Analysis of plant physiological mechanisms and aspects, including field experience. Prereq: 4310, 5340, 5350. 2 hrs and 2 periods (field trips). Sp.

5840 Methods and Instrumentation in Field Investigations (1, 1, 1, 1) Intensive field work using appropriate methods and instrumentation. Topics vary according to needs of students. May be repeated with consent of instructor. S/N only. E

5870 Experimental Plant Genetics (4) Genetics of plants stressing molecular aspects and including mechanisms of gene action, controlling elements, transformation, cytoplasmic inheritance, and adaptation. Prereq: Biology 3110 and Chemistry 3231: 3 hrs and 1 lab. W

5910-20 Developmental Plant Morphology (3,1) Developmental morphology of flowering plants stressing molecular aspects of morphogenesis and the processes of differentiation dormancy; germination; flowering; and senescence. Prereq: 4310 or Zoology 3210. W

6000 Doctoral Research and Dissertation (3-15) E

6010 Advanced Topics in Morphology of Vascular Plants (2-4) Topics of students determine content. Topics selected from broad categories of experimental and theoretical interest. Prereq: 3020-30 or 4120; 3210 or 5210 or 5910-20. 2 hrs and 1 lab and 1 lab for 5910-20. F, A, W


6310 Advanced Topics in Cytology and Cell Biology (2-3) Requirements and interests of students determine topics, such as actions of chemicals on actively dividing cells, current ultrastructural research in selected cytoplasmic organelles and cellular systems, experimental cytology, control of nuclear and animal cell. Prereq: 5340-30, 4120, 5910-20 or consent of instructor. May be repeated with consent of department. E


6420 Advanced Topics in Genetics (2-4) Literature surveys, selected topics in areas of special interest. Prereq: Biology 3110. Biochemistry 4110-20. May be repeated with consent of department. F, A.

6520 Seminar in the History of Botany (2-4)

6620 Advanced Topics in Plant Physiology (4) Requirements of student determine content, including
Chemistry

MAJOR DEGREES
Chemistry

Professors:
- G. Mamantov (Head), Ph.D. Louisville State
- N. S. Bowman, Ph.D. Princeton; C. A. Buehler (Emeritus), Ph.D. Ohio State; W. E. Buhr, Ph.D. Illinois; J. O. Chambers, Ph.D. Kansas;
- C. J. Collins, Ph.D. Northwestern; J. A. Deen, Ph.D. Miami; M. F. Eastham, Ph.D. California (Berkeley);
- W. H. Fletcher, Ph.D. Minnesota; W. W. Keenan, Ph.D. Texas;
- D. C. Kleinfeld, Ph.D. Princeton; J. W. Larsen, Ph.D. Purdue; M. H. Leitzke, Ph.D. Wisconsin;
- G. D. O’Kelley, Ph.D. (Emeritus), Ph.D. California (Berkeley);
- J. R. Peterson, Ph.D. California (Berkeley);
- G. K. Schweller (Emeritus), Ph.D. Illinois; A. D. Shirley (Emeritus), Ph.D. Iowa State; H. A. Smith (Emeritus), Ph.D. Harvard; T. W. Smith (Emeritus), Ph.D. Ohio State; W. A. Van Hook, Ph.D. Johns Hopkins; E. L. Whery, Ph.D. Purdue; T. F. Williams (Emeritus), Ph.D. Louisiana State; G. W. Wood, Ph.D.

Associate Professors:
- J. E. Bloor, Ph.D. Manchester; G. W. Kabalka, Ph.D. Purdue; J. F. Kintles, Ph.D. Akron;
- C. A. Lane, Ph.D. California (Berkeley);
- R. M. Magid, Ph.D. Yale; R. F. Magram, Ph.D.

Assistant Professors:
- J. L. Adcock, Ph.D. Texas; F. A. Grimm (Emeritus), Ph.D.
- J. D. Kovac, Ph.D. Yale; J. L. Magid, Ph.D.
- A. T. Smith, Ph.D. Oregon; W. A. Van Hook, Ph.D.
- D. A. Shirley, Ph.D. Illinois; J. M. Schweitzer, Ph.D. Indiana;
- C. Woods, Ph.D. North Carolina State.

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

THE MASTER’S PROGRAM

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

1. Research and a thesis to give 9 to 18 hours of graduate credit (5000).
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate coursework in chemistry and/or a related field to make an overall total of 45 hours. These additional hours must include one of the following sequences: 5110-20-29-30, 5250-59-69-70-79, 5340-50, 5410-20-30, 5710-20-30.
4. Participation in seminar (5911-21-31) during the entire period of graduate study. No more than 3 credit hours of seminar may be applied to the above requirements.
5. A final oral examination.

THE DOCTORAL PROGRAM

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

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Participation in seminar (5911-21-31) during the entire period of graduate study.
4. Thirty-nine hours of additional graduate coursework in at least 6 hours at the 6000 level and one of the following groups: (a) for analytical 5250-59-69-70-79; (b) for inorganic, 5420, 5710-20-30; (c) for organic, 5110-20-29-30, 5250-59-69-70-79.
5. A final oral examination.

These additional hours must include one of the following courses: 5250-60-70; 5340-50; 5710-20-30; 5410-20-30-50, 5710-20-30; (d) for physical, 5340-50, 5410-20-30-50; (e) for theoretical, 5340-50, 5410-20-30-50, Physics 5210.

Graduate coursework in one or more additional fields may be used for undesignated course work in this requirement upon approval of the student’s faculty committee.

A. Comprehensive advanced examination in the field of specialization.
B. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

A. Final oral examination.

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

1. Research and a dissertation on an environment- or energy-related problem to give at least 36 hours of graduate credit.
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate coursework in chemistry and/or related fields to give a totores of 45 hours. For emphasis in environment, these additional courses must include Chemistry 5220, 5250-59-69-70-79, Ecology 5310, and Environmental Engineering 4030. For emphasis in energy, these additional courses must include Chemistry 5410, 5610-20-30; a chemistry sequence (Chemistry 5110-20-30-35 or 5250-60-70 or 5420-30 or 5710-20-30-5810), and Mechanical Engineering 4160. All course selections must be approved by the appropriate departmental committee.
4. Participation in seminar (5911-21-31) during the entire period of graduate study. (No more than 3 credit hours of seminar may be applied to the above requirements.)

5. A final oral examination.

MASTER OF ARTS IN COLLEGE TEACHING

The requirements for the MACT degree in Chemistry consist of the satisfactory completion of:

1. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
2. Research and a thesis to give 9 hours of graduate credit (5000).
3. Sufficient additional graduate coursework in chemistry and/or related fields to make an overall total of 60 hours. These additional hours must include two of the following sequences: 5110-20-29-30, 5250-59-69-70-79, 5340-50, 5410-20-30, 5710-20-30.
4. Participation in seminar (5911-21-31) during the entire period of graduate study. No more than 3 credit hours of seminar may be applied to the above requirements.
5. A final oral examination.

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

7. A final oral examination.

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

1. Research and a dissertation to give at least 38 hours of graduate credit (6000).
2. Chemistry 4160-70, 5110-20 or 5710-20, 6730 or 6810; Mathematics 4540, 4610, 4710; Physics 4610-20-30, 5110-20-30, 5210, 5610-20-30.
3. 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 final oral examination.

For the Ph.D. degree in Chemistry with specialization in polymer science is conducted jointly with the Department of Chemical, Metallurgical, and Polymer Engineering, which offers a degree with a similar specialization.

The satisfactory completion of the following is required:

1. Research and a dissertation to give at least 38 hours of graduate credit (6000).
2. Chemistry 4160-70, 5511, 5540-50, 5610 or 5710, Polymer Engineering 4510.
3. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
4. Thirty hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
5. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

For the Ph.D. degree in Physical Chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 38 hours of graduate credit (6000).
2. Chemistry 4160-70, 5511, 5540-50, 5610 or 5710, Polymer Engineering 4510.
3. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
4. Thirty hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
5. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

For the Ph.D. degree in Physical Inorganic Chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 38 hours of graduate credit (6000).
2. Chemistry 4160-70, 5511, 5540-50, 5610 or 5710, Polymer Engineering 4510.
3. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
4. Forty-five hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
5. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

For the Ph.D. degree in Physical Organic Chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 38 hours of graduate credit (6000).
2. Chemistry 4160-70, 5511, 5540-50, 5610 or 5710, Polymer Engineering 4510.
3. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
4. Forty-five hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
5. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
6211 Selected Topics in Analytical Chemistry (3) Bonding in organometallic chemistry, homogeneous reactions of hydrometallocenes, aliphatic compounds and conformational analysis, monofunctional oxidized derivatives, carbonyl compounds, physical chemistry, aromatics, and spectral analysis of organic molecules by infrared, ultraviolet, nuclear magnetic resonance and mass spectral techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A


5550 Industrial Chemical Research (3) Practice of modern industrial research taught by case studies and visiting lecturers from industry. Course content varies with good past and current industrial research practices. Prereq: Completion of a 5000 chemistry course sequence.

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

5710-20-30 Theoretical Inorganic Chemistry (3, 3, 3) Spectral techniques. F

5810 Nuclear Chemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and interaction, nuclear reactions, radiation, and matter, radiation detection. Prereq: 1 yr of physical chemistry. F, W, Sp

5911-21-31 Chemistry Seminar (1, 1, 1) Discussion of diverse current chemistry research literature and general topics. May be repeated. Registration required each quarter except summer resident graduate students. SINC only. F, W, Sp

4000 Doctoral Research and Dissertation (3-15) E

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

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


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

6175 Organic Photochemistry (3) Physical and chemical effects of electron excitation of organic molecules. Experimental and theoretical techniques of photon-induced interactions, inter- and intramolecular reactions of akenes, ketones, dienes, dienones, aromatic compounds, and other photoactive species. Prereq: Two of 5110-20-30-35.

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

6210 Advanced Analytical Spectroscopy (3) Newer methods of spectroscopic analysis, including: transform methods, lasers in spectroscopy, fiber optic probes, and digital electronics, spectrophotometric techniques for remote sensing. Prereq: 5250.

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

6311 Selected Topics in Polymer Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5140-50-60-70 or consent of instructor. May be repeated.

6320 Natural Polymers (3) Structure, modification, and nonbiochemical utilization of natural polymers and polymers derived from naturally-occurring monomers. Prereq: 5140 or two of 5110-20-30-35.

6411 Selected Topics in Physical and Theoretical Chemistry (4) Subject matter varies among important topics of current significance. Prereq: Two of 5410-20-30-50; 5340-50. May be repeated. A

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

6430 Photochemistry and Radiations (3) Fundamental physical and chemical processes pursuant to excitation of molecules by photons and electrons; multiphoton processes and processes for understanding stereo- and reactivity of organic molecules. Prereq: Two of 5110-20-30-35.

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

6475 Electronic Structure of Radicals (3) Application of electron spin resonance to study of molecular conformation, structure, and bonding in organic and inorganic radicals; comparison of experimental results with theoretical predications based on Walsh rules and on INDO molecular orbital calculations. Prereq: 5540-50 and 6520.

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

6495 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces, reactions across, "direct" vs. "complex" modes of reaction, photodissociation, energy partitioning and effect on reaction mechanism, and quantum mechanics. Prereq: 5540 and 6520.

6498 Statistical Thermodynamics (3) Application of statistical mechanical methods to systems of chemical interest such as isocele effects on equilibrium and rate processes, phase equilibria, condensation phenomena. Prereq: 5410, 5450.


6520 Magnetic Resonance (3) Principles of molecular electronic spectroscopy underlying nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq: 5540.

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

6730 Topics in Quantum Chemistry (3) Application of newer methods to complex systems including metal complexes, polymers, and molecules of biological significance. Time-dependent phenomena. Effect of external fields and collision processes. Recent theories of chemical reactivity. Prereq: 5330.

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) (Same as Physics 6810.)

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

6820 Molecular Vibrational-Rotation Theory (3) (Same as Physics 6220.)

Classics

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


Assistant Professors: B. J. Levy, Ph.D. Texas; P. J. Nissen, Ph.D. Ohio State.

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

Greek

3010 Plato (3) A

3020 Herodotus (3) A

3030 Euripides (2) A

4020 Aeschylus, Sophocles (3) A

4030 Lysias (3) A

4040 Aristophanes (3) A

4500-6570 Directed Readings in Greek (3, 3, 3) F; W; Sp

Latin

3440 Livy (3) A

3450 Pliny and Martial (3) A

3460 Elegiac Poets (3) A

4120 Horace, Satires and Epistles (3) A

4310 Selected Readings from Latin Literature (3) A

4330-30 Selected Readings from Latin Literature (3, 3) May be repeated. A; A

4340 Horace, Odes (3) A

4350 Tacitus (3) A

4360 Lucullus (3) A

4370 Readings in Medieval Latin (3) A

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

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

GENERAL COURSES

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

3220 Greek Mythology in the Classical Period (3) A study of use of myth in literature, history, religion, philosophy, and art of Classical Age of Greece, and change of attitude toward myth from earlier periods. Familiarity with basic Greek myths is assumed. Readings, lectures, and discussion. (Same as Religious Studies 3220.) W
4560 Systems Programming (3) Computer organi-
ization and advanced programming. Machine lan-
guage and design of computers, representation of
information, microprogramming, software systems,
including operating systems and microprocessor
assemblies. Prereq: 3520 or equivalent. E

4570 Data Base Management Systems (3) Hierar-
chical, network and relational models; logical and
physical structure, recoverable integrity, back-
ups, computer languages, data manipulation. Em-
phasis on implementation and database design.
Prereq: 4510 and 4550 or equivalent. W

4610 Operating Systems—Concepts and Facilities
(3) Detailed examination of major operating system.
Memory, processor, device, and data management.
Interrupts, machine-level input-output, loaders and
relocation, device characteristics, data set organiza-
tions, SPOOLing. Prereq: 4510 and 4550. F

4620 Operating Systems—Case Studies (3) Alter-
natives in operating system design, dynamic allo-
cation, swapping, segmentation, time sharing, time
slicing, protection, concurrency, real time systems.
Examples from different operating systems analyzed
as appropriate. Prereq: 4610 or equivalent or
consent of instructor. W

4660 Compiler Construction (3) Practical experi-
ence in compiler design, including the use of com-
nputer programming languages and machines. Em-
phasis on regular and context-free languages. Intro-
duction to computational complexity and efficient
search techniques. Prereq: 3715. F, W

4730 Analysis of Non-Numeral Algorithms (3) Al-
gorithm design and analysis methods. Computer
representation and generation of configurations.
String matching, algorithms for sorting and search-
ing. Optimization techniques, backtrack program-
ning. Prereq: 4510. W

4750 Interactive Computer Graphics (3) Point plot-
ing vector generation, interactive graphical tech-
niques, two- and three-dimensional transformation,
perspective depth, hidden line elimination, shading,
softwares and hardware system design. Discussion of
use of these techniques in design, problem solv-
ing, mapping, architecture, and many other areas.
Prereq: Senior standing in Computer Science. Elec-
trical Engineering or Geography and a knowledge of
computer programming, or consent of instructor.
(Same as Electrical Engineering 4820.)

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

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

4860 Small Computer Systems (3) (Same as Elec-
trical Engineering 4860) W

4910 Analysis and Management of Computer In-
alizations (3) Analysis and design of computer sys-
tems; implementation, justification, personnel in
systems, perspective on system. Prereq: 3520 or
equivalent. W

4980-90 Special Topics in Computer Science (1-4,
1-4) Credit determined at registration. Prereq: Rec-
ognition of Computer Science staff. May be
repeated for credit to a maximum of 9 hrs.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise
required to complete the thesis. May be repeated
when such students use university facilities and/or faculty
time before degree is completed. May not be used toward
degree requirements. May be repeated. IDC only. E

5010 Computer-assisted Instruction (3) History
and development of CAI systems. Emphasis on
studying success and failure of major projects, future
role of CAI. Students may prepare CAI programs in
language to implement a CAI course. Prereq: 3510 or
consent of instructor.

5050 Computer Modeling and Simulation of Physi-
cal Systems (3) Computer modeling and simulation.
Inputs, defining functions, errors, outputs, interactive simulations as applied to various physical
processes. Emphasis on development of models to represent spatial relationships. Prereq: 3150 or 3515, and 3520 and Statistics 3450. A

5210 Artificial Intelligence (3) Simulation of intel-
ligence by computer. Sentences, searches, replan-
ning, expert systems, structure learning, machine
vision, expert systems. Prereq: 4510 and 4550 or equivalent. W

5250 Medical Computing (3) Achievements and
problems associated with utilization of computer
technology to field of health care. Various areas of
medical computing; laboratory data systems, pa-
tient monitoring systems, diagnostic assistance, pa-
tient records, automatic history taking, and hospital
administration systems. Prereq: 4510. Sp

5430 Theory of Computation (3) Development of major
components of compiler using constructs provided by
formal language theory. Recognizers, symbol ta-
bles, semantic routines, allocation of storage, code
optimization. Prereq: 4510, 4550, and 5750. A

5455 Finite Difference Methods for Partial Differ-
tential Equations (3) (Same as Mathematics 54455.) F

5465 Finite Element Methods (3) (Same as Mathe-
matics 54655) W

5475 Advanced Topics in Numerical Partial Differ-
tial Equations (3) (Same as Mathematics 54755.) Sp

5570 Advanced Data Base Management Systems
(3) Data model theory, comparison of several exist-
ing data base systems; implementation techniques,
selection and evaluation of database management,
security, authorization and protection, hardware ar-
chitectures, and future trends in DBMS area. Prereq:
4570 or equivalent background. W

5565-65-75 Numerical Mathematics (3, 3, 3) (Same
as Mathematics 5655-56-75) F, W, Sp

5670-80 Advanced Operating Systems (3, 3) Theory
and analysis of operating systems. Synchronization
and deadlocks. Analysis of operating systems using
mathematical models, simulation, and hardware
software monitors. Comparison of good heuris-
tics, modeling techniques. Prereq: 4570 or equivalent
or consent of instructor. W

5710 Finite Automata Theory (3) Finite-state se-
quences, transition matrices, experiments, decision
problems. Regular sets and regular expressions.
Prereq: 4610 or equivalent or consent of instructor.
Sp, A

5765 Theory of Formal Languages (3) Phrase-
structure languages, their processors and produc-
tors. Type 0, 1, 2, and 3 languages; operations on
languages and grammars; deterministic context-
free languages. Theory of translation. Prereq: 4710. W

5775 Combinatorial Algorithms (3) Algorithms for
solving optimization problems in graphs, networks
and matroids. Example: Algorithms for shortest path,
minimum spanning trees, and other combinatorial
problems. Time and space bounded computa-
tions; the P vs NP problems. Prereq: 4710. Sp, A

5810 Information Organization and Retrieval (3)
Organization of information and retrieval of in-
formation. Development of IR systems from online
to modern on-line operations. Information analysis
and dictionary building; techniques for computing, search
and matching procedures; retrieval process. In-
formation dissemination systems. Data base retrieval
systems. Prereq: 4510 and 4550. W

5840-50 Pattern Recognition (3, 3) Formulation of
pattern recognition problem. Role of pattern recog-
nition within framework of artificial intelligence.
Vector representation of signals. Introduction to
feature extraction problem. Deterministic and statis-
tical pattern classification algorithms. Syntactic pat-
tern recognition. Examples of practical applica-
tions. Computer solution of simplified pattern rec-
ognition problems. Prereq: 3150, Statistics 3450 and
Mathematics 45455. (Same as Electrical Engineering 5670-80) F, W

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

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

5970 Independent Study in Computer Science (1-3)
Special projects, topical facet study. Prereq: Consent
of instructor. May be repeated. Maximum 9 hrs.

Cultural Studies

Asian Studies

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

4120 Selected Topics in Asian Studies (4) Content
varies. May be repeated. Maximum 12 hrs.

4351-32-33-34 Advanced Chinese (4, 4, 4, 4) Taped
language program. Prereq: 3531-32 or equivalent
or consent of instructor. Must be taken in sequence.

4361-32 Advanced Japanese I, II (4) Reading in
Japanese primer with attention paid to finer points of
grammar. Conversation, drill and composition prac-
tice with native speaker. Must be taken in sequence.

4362-32 Advanced Japanese II, III (4) Reading in
Japanese primer with attention paid to finer points of
grammar. Conversation, drill and composition prac-
tice with native speaker. Must be taken in sequence.

Black Studies

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

4200 Senior Seminar on Pan-Africanism (4) Ex-
plores concepts and philosophers of Pan-
Africanism and implication of this ideology for vari-
rable societal institutions.

4300 Resource Materials in Black Studies (4) Intro-
duction to basic references such as bibliographies,
discours, and listings of audiovisuals in Afro-
American history, African history, and children's lit-
erature. Prereq: 2010 or 2020 and consent of in-
cstructor.

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

4560 Current Issues and Topics in Black Studies
(3-4) Problems, topics and issues in area of Black
Studies. Content and credit determined by instruc-
tor. May be repeated. Maximum 12 hrs.

4380 Black Women in American Society (4) Histori-
cal and contemporary socio-eco-political factors in
American society as they relate to the Black woman.
History 1950-80 recommended. Prereq: Consent of
instructor.

4880 Afro-American Psychology (4) (Same as Psy-
chology 4880)

Linguistics

4000 Topics in Linguistics (3) Content varies.
May be repeated. Maximum 9 hrs.

4200-30 Historical Linguistics, Neogrammarnan
School, and Growth of Structuralism (3, 3) Tra-
ditional and recent scientific approaches to lin-
guistics from Jacob Grimm and Franz Bopp through
nineteenth century. 4300—Traces change in linguis-
tics from Jacob Grimm and Franz Bopp through
nineteenth century. 4300—Traces change in linguis-
tics from Jacob Grimm and Franz Bopp through
nineteenth century. 4300—Traces change in linguis-
tics from Jacob Grimm and Franz Bopp through
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tics from Jacob Grimm and Franz Bopp through
nineteenth century.
**English**

**Major Degrees**

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

**Professors:**
- J. B. Harford, Ph.D. Princeton.
- E. W. Bratton (Associate Head), Ph.D. Illinois.
- P. A. Adams (Director of Graduate Studies), Ph.D. Texas.
- R. D. Drake, Jr., Ph.D. Yale.
- D. J. Leggett.
- Ph.D. Florida.
- J. E. Reese (Chancellor), Ph.D. Kentucky.
- N. J. Sanders, Ph.D. Indiana.
- J. E. B. Bodley, Ph.D. Northwestern.
- M. A. Texas; T. V. Wheeler, Ph.D. North Carolina.
- J. M. White, M. A. Cambridge; N. Wright, Ph.D. Yale.

**Associate Professors:**
- L. H. Burghardt, Ph.D. Chicago.
- D. A. Carroll, Ph.D. North Carolina.
- B. D. K. Dumas, Ph.D. Arizona.
- B. J. Gaines, Ph.D. Wisconsin.
- J. E. Gill, Ph.D. North Carolina.
- R. B. Miller, Ph.D. Brown.
- D. A. Myers, Ph.D. Florida.
- K. F. Robinson, Ph.D. Texas.

**Assistant Professors:**
- J. A. Armstredt, Ph.D. Duke.
- D. R. Cox, Ph.D. Missouri.
- D. F. Goslee, Ph.D. Yale.
- N. M. Green, Ph.D. Yale.
- T. A. Helffer, Ph.D. Cambridge.
- M. A. Lofaro, Ph.D. Maryland.
- C. J. Maland, Ph.D. Michigan.
- V. C. Martin, Ph.D. Tennessee.
- M. L. Price, Ph.D. California (Santa Cruz).
- M. P. Richards, Ph.D. Wisconsin.

**Visiting Lecturers:**
- W. Dykeman, B. A. Northwestern.
- G. Griffin, Ph.D. Vanderbilt.
- F. M. O'Hara, Ph.D. Illinois.

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

**The Master's Program**

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

For the degree of Master of Arts in College Tenure (M.A.T.), the requirements include (1) 45 quarter hours of courses in English, arranged as for the non-thesis M.A., (2) 2 hours in a special course designed for M.A.T. students, (3) 3 hours of a tutorial in the teaching of a foreign language, and (4) a thesis or 9 additional quarter hours of 5000-

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1. John C. Hedges Professor
2. Alumni Distinguished Service Professor
3. Not available for graduate credit.
440 Sociolinguistics (3) Exploration of language patterns in terms of correlations between them and the social and cultural implications of effects of language upon culture, and vice versa. Prereq: 3330 or consent of instructor. (Same as Linguistics 4440.)

450 Dialectology (3) Theories and methodologies of dialect research. Fieldwork and analysis. Prereq: 3340 or consent of instructor. (Same as Linguistics 4500.)

455 Varieties of English (3) Theories, methodologies, and practices of English dialectology with emphasis on implications for cultural pluralism. Prereq: 3330 or consent of instructor.

460 Special Topics in English Linguistics (3) May be repeated with consent of department. (Same as Linguistics 4660.)

447-1 English as a Second or Foreign Language (3, 3, 3) 4471—Applied linguistics in teaching and learning of English as a second or foreign language. Phonological and grammatical structure of non-English languages. Analysis of differences (phonological, grammatical, and lexical) between English and another language. Prereq: Second year of a foreign language. 4461—Materials and methods of teaching language with emphasis on preparation of materials and structured teaching situations. Theory of testing language competence and performance, with emphasis on construction of tests. Team teaching with an experienced member of the staff. Prereq: 4471. (Same as Linguistics 4471-81) W; Sp.

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

4651 Southern Literature through the Nineteenth Century (3) Southern writing from Colonial period to end of nineteenth century, including frontier humorists and local color writers. A

4652 Southern Literature in the Twentieth Century (3) Modern Southern literary renaissance, the Fugitive poets and Agrarians, Faulkner and more recent writers such as Welty, O'Connor, and Porter. W

4660 Emerson and Thoreau (3) A


4850 Milton (3) Emphasis on major poems. A

4860 Seventeenth-century Prose and Poetry (3) Bacon and Donne to Marvell. A

4910-20 Chaucer (3, 3) 4110—Early poems and Troilus and Criseyde. 4920—The Canterbury Tales. F

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student who wish to do research in literature, structure of language, paleography, Anglo-Latin backgrounds and sources, and related topics.

5160 Old English Poetry (Prereq: 5100.)

5170 Beowulf (Prereq: 5100, 5150)

5170-20-30 Studies in English Literature of the Sixteenth Century (3, 3, 3) A

5160-20-30 Readings in English Literature of the Nineteenth Century (3, 3, 3) A

5170-20-30 Readings in English Literature of the Nineteenth Century (3, 3, 3) A

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

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

6000 Doctoral Research and Dissertation (3-15) E

6110-20-30 Studies in Elizabethan Literature (3, 3, 3) A

6140 Studies in Old English Language and Literature (3) For students who know Old English well and wish to do research in literature, structure of language, paleography, Anglo-Latin backgrounds and sources, and related topics.

6150 Old English Poetry (Prereq: 5100)

6160 Beowulf (Prereq: 5100, 5150)

6170 Studies in Middle English (3)

6181-82-83 Studies in English Language (3, 3, 3)

6210-20-30 Studies in American Literature (3, 3, 3) A

6241-42 Studies in Colonial American Literature (3, 3) 6241—From Thomas Hariot through Increase and Cotton Mather. 6242—From Jonathan Edwards to adoption of Constitution.

6270-80 Studies in American Fiction (3, 3)

6310-20-30 Studies in Victorian Literature (3, 3, 3)

6410-20-30 Studies in Chaucer (3, 3, 3) A

6510-20-30 Studies in Spencer and Milton (3, 3, 3)

6550 Studies in Mode and Genre (3) Content varies. May treat drama, novel, short story, poetry, or satire, the comic, the tragic, etc., depending on professor. 6590 Special Topics (3) Content varies. May be repeated with consent of instructor.

6650 Special Topics (3) Content varies. May be repeated with consent of instructor.

6860 Textual Bibliography and Criticism (3) Study of evidence gathered from printing process to make critical judgments about text or literary work. Prereq: 5860 or consent of instructor.

6910-20-30 Studies in Twentieth-century Literature (3, 3, 3)

French

See Romance Languages

Geography

MAJOR

Geography

DEGREES

M.S., Ph.D.

Professors: S. R. Jumper (Head), Ph.D. Tennessee; C. A. Ikone, Ph.D. Georgia; E. H. Hammond, Ph.D. California (Berkeley); R. G. Long, Ph.D. Northwestern; C. W. Minner, Ph.D. Syracuse; T. H. Schmudde, Ph.D. Wisconsin.

Associate Professors: T. L. Bell, Ph.D. Iowa; L. W. Brinkman, Jr., Ph.D. Wisconsin; J. R. Carter, Ph.D. Georgia; C. T. Paludan, Ph.D. (UT Space Institute); J. B. Rehder, Ph.D. Louisiana State.

Assistant Professors: W. N. Cherry, M.S. Tennessee; B. Rainey, Ph.D. Northwestern.

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

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours beyond completion of a sound undergraduate major program. At least one-half of the credits in the graduate program must be at or above the 5000 level, of which no more than 9 hours may be thesis courses, and must include 5150, 5160, either 5170 or 4210, and (at each offering during residency) 5160. Thesis and final examination required.

THE DOCTORAL PROGRAM

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

3410 Intermediate Economic Geography (4) Concentration in economic techniques in location planning: Locational patterns in agriculture, manufacturing, and service activities. F or W

3430 Urban Geography (4) Concepts and theories concerning development and significance of systems of cities and internal morphology of cities. F
3460 Rural Geography (4) Geographical appraisal of rural areas of the United States, including small towns and their environs. Problems and potentials of rural America. W
3490 Geography of Resources (4) Study of factors related to variations in resource availability from time to time; the geographical interplay of nature and man with special emphasis upon energy and metallic resources. F
3520 The Atmospheric System and Man (4) Overall consideration of the general circulation system leading to world patterns of climate, human comfort, vegetation, and surface materials. W
3550 Cultural Geography (4) Basic concepts of culture; methods and background of cultural geography; world patterns of cultural phenomena. A
3590 Geography of Middle America (4) A survey of the cultural, economic, and social distribution patterns of Central America and the West Indies. W
3680 Cultural Geography (4) Basic concepts of culture; methods and background of cultural geography; world patterns of cultural phenomena. A
3700 Geography of Middle America (4) A survey of the cultural, economic, and social distribution patterns of Central America and the West Indies. W
3730 The Land-Surface System and Man (4) Nature and regional variations in relationships among surface form, water, vegetation, and surface materials. W
3790 Geography of Middle America (4) Covers Mexico, Central America, and the West Indies. W
3840 Geography of Appalachia (4) Interrelation of physical, geographic, and social patterns to give distinctive character to regions of the United States and Canada. W
3870 Geography of Asia (4) A survey of the physical, cultural, and economic characteristics of the countries of Asia, excluding the Soviet Union. Sp
3910 Regional Geography of United States and Canada (4) Major physical, economic, and social distribution patterns of the United States and Canada to give distinctive character to regions of United States and Canada. W
3920 Geography of the American South (4) Geographical appraisal of southeastern United States, including physical environment and human resources. Origin and development of contemporary economic and cultural traits of the area. F
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. F
4075 Geography of Transportation (4) Geographic examination of transportation systems, emphasizing transport of people on highways and by public facilities. Relationship of these systems to changing geography of cities and urban hinterlands. Sp
4100 Quantitative Methods in Geography (4) Geographical applications of statistical techniques, point pattern analysis, and analysis of areal units. Prerequisite: Mathematics 3000 or consent of instructor. W
4210 Problems in Geographic Method (4) Examples of problems and approach in geographic analysis and synthesis. Emphasis on character of geographic generalization; classification, regionalization, and questions of scale. A
4240 Historical Geography of the United States (4) Survey of changing human geography of the United States during four centuries of settlement and development. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development. Sp
4510 Principles of Geomorphology (4) (Same as Geography 4510.)
4550 Geography of Soils (4) Soils as physical systems and their relationship to environments. Investigation of the specific role of soil as a management system. F
4610 Industrial Geography (4) Factors affecting location of manufacturing activities, with emphasis on the United States. Prerequisite: 3410 or consent of instructor. A
4630 Geography of Agriculture (4) A
4710 Cartographic Design and Production (4) Principles and practice of design, construction, and reproduction of maps. Recommended prerequisite: 3700. 2 hrs and 2 labs. Sp
4720 Data Mapping (4) Automated techniques of representing surfaces, using geographical information systems. Recommended prerequisite: 3700 and knowledge of computer programming. F
4730 Advanced Cartography (4) Map production from design through color proofs. Prerequisite: 3700, 4710, and 4720 or consent of instructor. W
4740 Remote Sensing: Types and Applications (4) Basic principles and uses of aerial photography and other remote sensing techniques. Emphasis upon value of various types of imagery for geographic interpretation and simple mapping. Prerequisite: Consent of instructor. W
4750 Interactive Computer Graphics (3) (Same as Computer Science 4750.)
5000 Thesis (1-15) E
5100 Colloquium in Geography (1) Discussion of departmental research, current literature, and general topics. Registration at each offering of required resident graduate students. May be repeated. Maximum 8 hrs. SINC only. W, Sp
5101 Foreign Study (1-12) See page 95. E
5102 Off-campus Study (1-12) See page 95. E
5150 Introduction to Geographical Research (3) Aims of geographical research; survey of printed source materials; practice in effective presentation of research findings. F
5160 Research Design and Field Problems (4-6) Development of research problems, preparation of appropriate study designs, and practical field application. W
5170 Geographic Concept and Method (3) Traditional and modern thought regarding nature, scope, problems, and methods of geography. A
5200 Special Problems in Geography (2-6) Reading and research on problems or topics of interest to individual students. Students must define topic and receive instructor's approval of study plan before registering for course. May be repeated with consent of instructor. E
5250 Topics in Historical Geography (3) Examination of trends, concepts and methods in historical geography. Prerequisite: 4240 or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. F
5290 Advanced Cultural Geography (3) Geographic analysis of rural settlement in Eastern United States, with emphasis upon New England, Tidewater East, and Upland South, and specific application to Southern Appalachia. Includes field work and final paper. Prerequisite: 3660 or consent of instructor. Sp
5310 Topics in Regional Geography of the United States (3) Interrelation of problems and trends in one or more regions of the United States, with emphasis upon New England, Tidewater East, and Upland South. Prerequisite: 4240 or consent of instructor. Maximum 9 hrs. A
5320 Topics in the Geography of the American South (3) Geographic perspective on economic and cultural aspects of southeastern United States. Topics vary. May be repeated with consent of instructor. Maximum 9 hrs. A
5410 Advanced Topics in Economic Geography (3) Examination of trends, problems, and methods in modern economic geography. Prerequisite: 3410 or consent of instructor. May be repeated. Maximum 9 hrs. A
5520 Advanced Urban Geography (3) Analysis of research on urban forms, urban morphology, urban problems and urban spatial behavior. Prerequisite: 3400 or consent of instructor. A
5550 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methods in geography of land-surface system. Prerequisite: 3550 or consent of instructor. May be repeated with consent of instructor. F
5710 Seminar in Geography (3) May be repeated with consent of instructor. F
5720 Seminar in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate packaged computer programs; usefulness to geographer's research; techniques of sampling and data collection. Prerequisites: 4100 or consent of instructor. Sp
5740 Advanced Topics in Remote Sensing (3) Applied research using remote sensing and aerial photography; strict training in interpretation and mapping of geographic data. Prerequisite: 4740 or consent of instructor. Sp
5790 Topics in Cartography (3) Trends, concepts, problems, and methods in cartography. Prerequisite: 4730, or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A
5915 Regional Geomorphology (4) (Same as Geology 4915.)
6000 Doctoral Research and Dissertation (3-15) E
6110-20 Seminar in Economic Geography (3, 3) A
6220-30 Seminar in Urban Geography (3, 3) A
6240-50 Seminar in Historical Geography (3, 3) A
6250-70 Seminar in Cultural Geography (3, 3) A
6310-20 Seminar in Rural Geography (3, 3) A
6410-20 Seminar in Regional Geography of the United States (3, 3) A
6610-20 Seminar in Regional Geography of Latin America (3, 3) A
6710-20 Seminar in Physical Geography (3, 3) A

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

Geological Sciences

MAJOR

DEGREES

Geology

M.S., Ph.D.

Professors:

K. R. Walker (Head); Ph.D. Yale; G. Briggs (Associate Dean); Ph.D. Wisconsin; H. J. Kiepfer (Emeritus), Ph.D. Ohio State; O. C. Kopp, Ph.D. Columbia; H. H. McLaughlin, Ph.D. Pennsylvania; D. H. Roeder, Ph.D. (Germany); L. A. Taylor, Ph.D. (Lehigh); J. G. Walls (Emeritus), Ph.D. North Carolina.

Associate Professors:

G. M. Clark, Ph.D. Pennsylvania State; D. E. Smith, Ph.D. Western Ontario.

Assistant Professors:


THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours including at least 18 hours in courses (other than thesis) numbered above 5000. A minimum of 24 hours in geological 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 not taken while in graduate school. Thesis committee and topic must be approved by graduate program committee. Qualifying examination is given the second quarter.

THE DOCTORAL PROGRAM

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

1. Program to be determined by faculty committee. Requirements include a minimum of 84 quarter hours in courses for graduate credit, in addition to dissertation. These courses must include a minimum of 45 hours in the 5000 or 6000 series, of which at least 15
hours must be in the 6000 series. Up to one-third of the required hours may be taken in related fields. A Master's degree is recommended.

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

3. Each Ph.D. student must satisfy a research tool requirement which will be determined by his/her faculty committee and which will consist of one of the following:
   a. Demonstration by examination of a reading knowledge in one modern foreign language in which there is a significant body of geological literature.
   b. Completion of course 3030 in an appropriate foreign language with a B or better.
   c. Courses (minimum of 6 hours) at 3000 level or higher taken for undergraduate credit and completed with a B average in appropriate mathematics, statistics, or computer science courses. The courses must be taken during a student's graduate program and must be approved by the student's entire committee.

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

3180 Introduction to Earth Materials (4) Study of minerals and rocks. Laboratory includes both hand specimen and analytical methods of identification. Prereq: 1110-20 or equivalent. 3 hrs and 1 lab. A

3190 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen, chemical and x-ray methods of identification. Prereq: 1410. Chemistry 1110-20 or equivalent. 3 hrs and 1 lab. A

3210-20 Invertebrate Paleontology (4, 4) Systematic review of important invertebrate fossil groups. 3210—Porifera to Annelida, including cnidarians, echinoderms, and conodonts. 3220—Mollusca through lesser Chordata, including arthropods and echinoderms. May be taken separately or in sequence. Prereq: 3180. Biology 1210-20 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) Introduction to principles and materials of paleontology as applied to interpretation of earth history. Prereq: 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

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

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

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

3360 Stratigraphy-Sedimentation (4) Introduction to stratigraphic principles and practices and of methods of interpreting depositional environments. Prereq: 1420 and 3180. 3 hrs and 1 lab or field period.

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

3410 Principles of Ground Water Geology (3) Geologic principles of groundwater occurrence and behavior of water. (Same as Water Resources Development 3410). 3 hrs and 1 lab.

3510 Introductory Environmental Geology (4) Geologic principles involving earth environment and resources, and geologic parameters associated with their control and misuse. Prereq: 1420 or consent of instructor. 3 hrs and 1 lab or field period.

3610 Quaternary Geology for Engineers (3) Erosional and depositional processes, landforms, ground water. Prereq: 2610 or equivalent. 2 hrs and 1 lab or field period.

4101 Principles of Economic Geology (4) Formation of mineral deposits. Prereq: 3180, 3370, or equivalent.

4115 Elementary Applied Geophysics (4) Basic principles of electrical, seismic, gravity and magnetic surveying. Recommended: 1420, Physics 2220 or 3220. 3 hrs and 1 lab.

4130 Sedimentology (4) Introduction to physical processes of sedimentation: transport of sediments and formation of sedimentary structures, river flows, waves, tides, and ocean circulation. Prereq: 3180. 3 hrs and 1 lab.

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

4240 Paleobotany (4) Survey of fossil record of plants with particular emphasis on comparative morphology and evolutionary trends in major plant groups, and chronological successions and geographic distribution of past floras on earth. Prereq: 1420 or 2210; Botany 3010-20 or consent of instructor. (Same as Botany 4240). 3 hrs and 1 lab or field period.

4250 Evolution of Higher Taxa (4) Current evolutionary theory in context of paleontology, patterns of evolution in fossil organisms at family level or higher. Prereq: 3260. Recommended prereq: 3910-20, 2 hrs and 1 2-hr seminar.

4260 Biostratigraphy (3) Application of paleontologic data to stratigraphic study, codification of stratigraphic nomenclature and recommended practice. Prereq: 3260 and 3360. 1 hr and 1 2-hr seminar.

4310 Geologic Mapping (4) Introduction of maps and methods of interpretation. Prereq: 1110-20 or equivalent. 12 hrs geology. 3 hrs and 1 lab or field period.

4331 Quaternary Geology of North America (4) Quaternary geologic processes, stratigraphy, sedimentary environments, Pleistocene glaciation and unglaciated North America and oceans. Prereq: 1410, equivalent course, or consent of instructor. 2-2.5 hrs lectures per week.

4322 Quaternary Paleoecology (4) Pollen and plant-macrofossils, characterization of vegetation and climate change during Quaternary. Prereq: Consent of instructor. 2-2.5 hrs lectures per week.

4333 Quaternary Field and Lab Techniques (4) Techniques for environmental characterization and reconstructions, pollen and plant-macrofossil identification, description of site stratigraphy and sedimentology. Prereq: 1410, equivalent course, or consent of instructor. 2 hrs and 2 labs.

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

4440 Field Geology (8) Five-week field course, first term summer quarter. Advanced undergraduates or first-year graduates in geology. Employs entire time of students. Prereq: 3360. May be taken no later than and of fall quarter. Prereq: 12 hrs geology and consent of instructor.

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

4510 Principles of Geomorphology (4) Gradational processes acting within surficial systems and landscapes. Prereq: 1410-20-30 or equivalent. (Same as Geography 4510). 3 hrs and 1 lab.

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

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

4650 Mineral Phase Equilibria (3) Principles of phase chemistry and application of phase equilibria studies in rock-forming mineral systems as aid to understanding geologic processes and interpretation of rocks. Prereq: 4610 or consent of instructor.

4770 Evolution of Oceans and Continents (4) Introductory study of primitive oceans and continents that have occurred in earth's crust with emphasis on modern concepts of continental drift and plate tectonics. Prereq: 1420.

4780 World Geology of Petroleum (4) Geologic habitat of petroleum deposits, methods of exploration and reserve assessment, geology and global distribution of known and potential reserves. Prereq: 1410 or equivalent and 3360 or equivalent.

4790 Uranium Deposits (4) Distribution, characteristics, and origin of different types of uranium deposits. Prospecting and evaluation of uranium deposits with special reference to domestic potential resources. Prereq: 4110 or consent of instructor. 3 hrs and 1 lab/field/seminar period.

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

5000 Thesis (1-15) E

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

5069 Experimental Geochmistry Laboratory (1-3) Independent lab study of problem in geochmistry under laboratory technique, including experiment design. Prereq: 4650 and 4110 or consent of instructor.


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

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

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

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

5340 Seminar In Local Stratigraphy (3) Stratigraphy of Knoxville area.

5350 Selected Topics in Geology (1) Presentation of graduate research topics, topics from current literature, and subjects of general interest. Prereq: 3360 or equivalent. May be repeated. Maximum 4 hrs.

*Not available for graduate credit for geology majors.
programs.

**LANGUAGE DEGREE PROGRAMS**

**MAJOR**

German

German Language and Literature

Emeritus Professors:
- E. T. Hankamer, Ph.D. Bonn (Germany)
- R. L. W. Nordlie, Ph.D. Ohio State

Professors:
- H. Kray, Ph.D. Ohio State; J. E. Fiel, Ph.D. Pennsylvania; H. W. Fuller, Ph.D. Wisconsin; R. L. Hiler, Ph.D. Cornell; J. C. Osborne, Ph.D. Northwestern.

Associate Professors:
- J. L. Elliott, Ph.D. Michigan;
- N. A. Lauckner, Ph.D. Wisconsin; D. E. Lee, Ph.D. Stanford; M. P. Rice, Ph.D. Vanderbilt.

Asst. Professors:
- D. A. Fine, Ph.D. Indiana; C. J. Mellor, Ph.D. Chicago; U. Pfefferkoff, Ph.D. Connecticut.

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

THE MASTER'S PROGRAM

In addition to the general Graduate School requirements as stated on page 19, the department requires 36 quarter hours in approved courses, including at least 18 hours in courses numbered above 5000. In addition to coursework, the student is required to write a thesis, for which he/she may get a maximum of 9 hours credit. The minimum quarter hour credit for the M.A. is 45 quarter hours.

**MASTER OF ARTS IN COLLEGE TEACHING PROGRAM**

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

**THE DOCTORAL PROGRAM**

The student must fulfill the general requirements for the Ph.D. degree set by the Graduate School. The candidate for the doctoral degree must complete a minimum of 81 quarter hours of course work beyond the Bachelor's degree in addition to 36 hours of doctoral research and dissertation. At least 45 quarter hours of the minimum must be taken in 5000 or 6000 courses. Of these 45 hours, a minimum of 18 hours must be chosen from the prosemaster (5200) and the literary or philological seminars (6210-20-30-50-60 and 5310-20-30). At least 9 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 foreign languages, French and another language, such as Italian, Latin or Russian, appropriate to the field of research. A preliminary comprehensive examination, both written and oral, in German language and literature and the minor field or fields, must be passed before the student may be admitted to candidacy. The examination will be based on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. The candidate will be required to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

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

**3010-20-30 ELEMENTS OF GERMAN FOR UPPER DIVISION AND GRADUATE STUDENTS (3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. Not credit for students having completed elementary German. E.**

**3210-20-30 GERMAN LANGUAGE IN ENGLISH TRANSLATION**

**PHILOSOPHY**

The philosophy major offers two programs: the Bachelor of Science in Philosophy and the Bachelor of Arts in Philosophy.

**BACHELOR OF SCIENCE IN PHILOSOPHY**

This program is designed for students who wish to major in philosophy and pursue a career in professional philosophy. It is intended to provide a strong foundation in the major areas of philosophy, including logic, metaphysics, epistemology, ethics, and social and political philosophy. The program requires a total of 120 semester hours, including 30 semester hours in philosophy. Students must complete a core curriculum of courses in philosophy, mathematics, and natural science. In addition, students must elect at least 90 semester hours of upper-division coursework in philosophy, and at least 45 semester hours of upper-division coursework in the major fields of philosophy.

**BACHELOR OF ARTS IN PHILOSOPHY**

This program is designed for students who wish to major in philosophy and pursue a career in fields related to philosophy, such as law, business, and education. It is intended to provide a strong foundation in the major areas of philosophy, including logic, metaphysics, epistemology, ethics, and social and political philosophy. The program requires a total of 120 semester hours, including 30 semester hours in philosophy. Students must complete a core curriculum of courses in philosophy, mathematics, and natural science. In addition, students must elect at least 90 semester hours of upper-division coursework in philosophy, and at least 45 semester hours of upper-division coursework in the major fields of philosophy.
tion (3-4, 3-4, 3-4) No foreign language credit. No change in credit hours after add deadline. Students opting for 4200-20-30, 3210-20-30 to pursue vocations other than teaching. F; W; Sp
3240 Old Norse Literature in English Translation (3-4) The popular sagas of Scandinavian kings, great Icelandic family sagas, and Vindland sagas, narrating discovery of America around year 1000. Myths, mythical and heroic poems of the Edda. A 4110-20-30 Studies in Classical and Modern Writers (3, 3) Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. May be repeated with consent of department. 4140-50 Selected Topics in German Literature from 1750 to the Present (3, 3) Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. Su 4160 Studies in German Authors (3) Life and works of a single outstanding German literary figure. Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation). May be repeated. Su 4170 Theatrical German (1-3) Performance in one or more German plays. Prereq: Intermediate German or equivalent or consent of instructor. May be repeated with consent of department. W; Sp 4210-20-30 Studies in German Literary Types (3, 3, 3) Poetic and dramatic poetry. 4220—Drama. 4230—Narrative prose. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30, 3310) or equivalent. A 4350 Introduction to Descriptive Linguistics (3) (Same as French, Russian, and Spanish 4250.) F 4260 Introduction to Historical and Comparative Linguistics (3) Linguistic change, protolanguages. Phonological and morphological change. Cultural, historical, sociological influences upon the development of language. Semantic change. Lexicography. All these topics cogently illustrated by selected examples from Indo-European languages. Prereq: 9 hrs of upper division English, or 9 hrs 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 4260.) W 4310-20 History of German Language (3, 3) 4610-20-30 German Civilization (3, 3, 3) Prereq: Intermediate German or equivalent. F; W; Sp 4810-20.30 Medieval German Language and Literature (3, 3, 3) 5410—Introduction to Middle High German. 5420-30—Readings in Medieval German literature. F; W; Sp 5500 Studies in German Literature (3) Content varies. May be repeated. Maximum 9 hrs. 5510 German Humanism and the Reformation (3) A 5520 German Baroque Literature (3) A 5530 The Enlightenment and the Rococo (3) A 5540 German Classicism (3) A 5560 Goethe's Faust (3) A 5560 German Romanticism (3) A 5570 German Realism and Naturalism (3) A 5580 Modern German Literature (1889-1945) (3) A 5590 Modern German Literature (1945-Present) (3) A 5600 German Literary Theory and Criticism (3) W 5610-20-30-50-60 Directed Readings in German Language and Literature (3, 3, 3, 3, 3) E 5710 Introduction to Old Norse (3) Phonology, morphology and syntax of Old Norse. Representative readings in Old Norse. A 5720 Readings in Old Norse Prose (3) Intensive readings of Old Norse prose works. Icelandic saga as literature. A 5730 Readings in Old Norse Poetry (3) Intensive reading of Eddic poems as a literary genre and repository of ancient Germanic customs, legends, and mythology A 6000 Doctoral Research and Dissertation (3-15) E 6100 Gothic (3) Phonology, morphology, and syntax of Gothic language. Relationship to Indo-European languages and other Germanic languages. Readings from Gothic Bible. A 6120-30 Old High German (3,3) 6120—Introduction: phonology, morphology, and syntax of Old High German of eighth and ninth centuries. Dialects. Representative readngs. 6130—Literary and Linguistics; prose and poetry of period from linguistic and literary point of view. Development of language and literatuure. Literature of Old High German period. A 6140 Old Saxon (3) Phonology, morphology, and syntax of Old Saxon. Representative readings. A 6210-20-30-40-50-60 Seminar in German Literature (3, 3, 3, 3, 3, 3) May be repeated. E 6310-20-30 Seminar in German and Germanic Philology (3, 3, 3, 3) May be repeated. E Russian 3010-20-30 Elements of Russian for Graduate Students and Seniors (3, 3, 3) For graduate students preparing for language examinations and seniors desiring knowledge of a second foreign language. Prereq: 2 years of some foreign language in college or consent of department. Undergraduate credit only. No credit for students having completed 1 yr of Elementary Russian. 3210 Nineteenth-century Russian Literature in English Translation (3-4) Realism and the novel; selections from works of Pushkin, etc. F 3220 Works of Leo Tolstoy in English Translation (2-4) A Saint and Peace, Anna Karenina, and other works. W 3221 Works of M. Dostoevsky in English Translation (3-4) Crime and Punishment, Brothers Karamazov and other works. F or W 3230 Twentieth-century Russian Literature in English Translation (3-4) Russian modernism and literature under the sovets. Sp 3240 The Russian Drama in English Translation (3-4) Selections from works of Gorky, Chekhov, Pushkin, Gogol, Ostrovsky, Turgeniev, and others. F 3250 The Works of Ivan Turgenev and Anton Chekhov in English Translation (3-4) Sp 3260 Russian Folklore in English Translation (3-4) Sp 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. A prerequisite for Russian required. (Same as Philosophy 3270 and Religious Studies 3370) 4010 Selected Topics in Russian and East European Studies (1) Interdisciplinary seminar on selected topic using comparative approach. 4110-20-30 Studies in Major Russian Writers (3, 3, 3) Content varies. Pushkin, Lermontov, Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov and others. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30, 3310) or equivalent. May be repeated. F; W; Sp 4210-20-30 Studies in Russian Literary Periods (3, 3, 3) 4210—Russian Romanticism. 4220—Russian Modernism. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30, 3310) or equivalent. A 4250 Introduction to Descriptive Linguistics (3) (Same as German, French, and Spanish 4250.) F 4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, French, and Spanish 4250.) W 4270 Introduction to Slavic Linguistics (3) 4310-20-30 Advanced Studies in Russian Language and Literature (3,3,3) intended primarily for students majoring or minoring 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. May be repeated. Maximum 9 hrs each. 4410-20-30 Directed Readings in Russian (3, 3, 3) intended primarily for students participating in program in Russian and East European Area Studies, course will involve individual study relating to student's major field. Prereq: 9 hrs of 3000 courses in Russian (exclusive of 3010-20-30, 3210-20-30, 3310) or equivalent. E Greek See Classics

History

DEGREES

MA, MACT, Ph.D.

History

M.A., MACT, Ph.D.


THE MASTER'S PROGRAM

Master of Arts—Plan I: Course requirements include History 5240, and either 5250 or 5260; one M.A. reading course; at least 6 additional hours 5300 or above of 5240-20-30 or above. Total hours, including thesis—45.

Plan II: History 5240, and either 5250 or 5260; two M.A. reading courses; 12 additional hours 5300 or above, at least 2 of which must be 5310-20-30 or above. Total hours—45. Plan I and II require evidence of proficiency in one foreign language before the M.A. degree is granted.
College of Liberal Arts

MASTER OF ARTS IN COLLEGE TEACHING

Course requirements include History 5240-50-60, 5271-72-73, and Continuing and COLLEGE TEACHING.

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

II. Early Modern
   (1) Europe, 1815-1914
   (2) European World Since 1914
   (3) United States, 1815-present
   (4) Latin America, 1897-present
   (5) East Asia, 1641-present
   (6) Middle East, 1798-present

IV. National, Sectional and Topical
   (1) England, 1485-1763
   (2) Great Britain, 1760-present
   (3) France, 1559-1815
   (4) France, 1789-present
   (5) Germany, 1555-1806
   (6) Germany, 1806-present
   (7) Russia, 1600-1800
   (8) Russia, 1800-present
   (9) Colonialism and Imperialism
   (10) Diplomatic History of the States

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

Preliminary examinations will be both written and oral.

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

3060-70-80 History of Western Religious Thought and Institutions (3, 3, 3) (Same as Religious Studies 3790-80-90)

1640-50-60 History of England (3, 3, 3) 3410—To 1668, 3150—1689 through the reform Bill of 1832. 3160—1832 to the present.

3311-21 History of Tennessee (3, 3, 3) 3311—Eighteenth Century to Civil War Era. 3321—1865 to present.

4121-12-13 Renaissance and Reformation (3, 3, 3) 3411—Renaissance, 3422—Reformation 1517-1550. 3419—Catholic Reformation and Wars of Religion. (Same as Religious Studies 3411-12-13.)


4345-46 History of France (4, 4) 3445—To 1787. 3446—Since 1787.

3740-80-90 History of Russia (3, 3, 3) 3470—To 1801. 3480—Nineteenth Century. 3490—Twentieth Century.

3610-20 The American Colonies and the American Revolution (3, 3) 3610—Settlements to 1754. 3620—1755-1789.


3710-20-30 History of Germany (3, 3, 3) 3710—First Reich to 1713. 3720—Habsburg and Hohenzollern and the formation of the German nation. 3730—From a unified to a divided Germany, 1890 to present.

3740 The City in Europe, ca. 1200-1900 (3) Survey of European urban growth and the comparative analysis of the major periods of urbanization of the thirteenth and nineteenth centuries. Emphasis on the relationship between demographic, economic, and social foundations of cities and political and cultural factors.

3751-52 Ancient Near Eastern Civilization (3, 3) 3751—Early and Middle Bronze Ages. 3752—Late Bronze Age and Iron Ages.

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

3780-90 History of the Middle East (3, 3) 3780—Rise and spread of Islamic Civilization to the 16th Century. 3790—The impact of the West on the Middle East from the sixteenth century to World War I.

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

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

3810-20-30 History of Asia (3, 3, 3) 3810—Traditional China and Japan, ancient to mid-nineteenth century. 3820—Modern China, Japan, and Korea, mid-nineteenth century to 1920s. 3830—Contemporary China, Japan, and Korea to 1920s.

3870-80-90 History of Latin America (3, 3, 3) 3870—Exploration, conquest, settlement and Colonial life to 1800. 3860—Most of the countries of South America, 1800 to present. 3850—Mexico, Central America and the Caribbean, 1800 to present.


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

4120-30 History of Colonialism and Imperialism (3, 3, 3) 4120—Background; age of discovery and exploration to the twentieth century. 4130—Nineteenth 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 images of women in Medieval, Renaissance, and Victorian periods. Attention given to parallel changes in structure of family as well as relationship between Western Culture and women's protest movements.

4290 Women in American History (4) Approaches of 4280 applied to American Society.


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

4370 U.S. Military History, 1775 to the Present (4) Examination of national military strategy and weaponry involved in the wars, and relationship among American society and its armed forces.

4380 Civilian-Military Relationships in the Modern Western World (3) Civilian-military affairs from about 1910 to 1600 in Western Europe, Russia and America, emphasis in Western Europe; e.g., Dreyfus Affair, Army in Nazi Germany, and Truman-MacArthur controversy.
thesis for which 9 hours must be earned along with 36 additional hours of work in acceptable courses numbered above 4000. Of the additional hours, 9 may be in an area outside the department and 18 must be in courses in mathematics numbered above 5000.

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

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

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

1. Pass written examinations covering four subjects, at least three of which must be from the following list:
   a. Algebra 5510-20-30
   b. Functions of a Complex Variable 5110-20-30
   c. Topology 5910-20-30
   d. Functions of a Real Variable 5210-20-30
   e. Linear Analysis 5250-60
   f. Partial Differential Equations 5450-60-70
   g. Ordinary Differential Equations 5870-80-90

2. Numerical Mathematics 5655-65-75
3. Statistical Mathematics 5750-60-70

Students may not take examinations in both d. and e. nor may they take examinations in both f. and g. as their preliminary examination subjects.

Those students who choose four from this list must choose two from a, b, d, and e, and the students who choose only three from this list must choose one from a to e.

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

A student may take as many of the written examinations as desired at any time these exams are given subject to the following conditions:

a. The exams to be taken must be approved in advance by the student's supervisory committee.

b. At most 4-n exams may be taken at any one time, where n denotes the number of exams previously passed by the student.

c. At most two exams may be taken prior to passing one language exam.

d. A student may take a collection of written examinations a maximum of 4 times, but no student will take four exams counting possible repetitions, will be permitted to take another round of exams.

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

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

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

The written exams mentioned in 1. are normally given two times a year, once in the fall and once in the spring. The fall exams usually are given before the fall quarter begins, and the spring exams are given during the spring quarter.

3050 Elementary Probability and 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. Pre-req: 3050 or consent of instructor. Sp, Su

3090 Polynomials and Rings (3) Introduction to abstract algebra, beginning with study of integers followed by modular concepts, integral domains, and fields. Emphasis is given to various ring theoretic properties shared by integers and polynomial rings over certain fields. Pre-req or coreq: 3090 or consent of instructor.

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

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


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

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

* These courses are sometimes offered in special summer institutes for an 8-week period with 4 hrs credit. Such special courses are designed 3051, 3061, etc.
3220 History of Mathematics (3) Survey of development of various branches of mathematics, from ancient to modern times. Prereq: 1860 or 2550 or equivalent.

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

3320 Non-Euclidean Geometry (3) Foundations of geometry, Ellitic, hyperbolic plane geometry. Prereq: 1 yr of college mathematics. W

3330 Transformational Geometry (3) Fundamental transformations in Euclidean geometry. Classification of isometries and similarities; symmetries of a polygon; inversions. Prereq: 1 yr of college mathematics. Sp

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. Prereq: 1550-60 or 1860. Su

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

3720 Theory of Equations (3) Techniques for finding roots of polynomial equations. Topics covered include complex, integral, and rational roots, multiple roots, irrational roots, Hermite's method of approximating roots, and formulas for quadratic, cubic, and bicubic equations. Prereq: 1 yr of college mathematics. W

3725 Advanced Discrete Structures (3) (Same as Computer Science 3725.) E

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. Prereq: 2860 or consent of instructor. F, W; Sp

3810 How To Prove It (3) Course is designed to improve understanding of nature and methods of mathematical proof by means of practice and participation in seminar setting. Variable content but will include certain standard topics such as elementary set theory, relations and functions, and mathematical induction. Coreq: 2850 or 2560. E

3920-30 Topology of Euclidean Spaces (3, 3) Topics will include topology of line and plane, separation properties, compactness, connectedness, completeness, continuous functions, homeomorphisms, continua, and topological invariants. Must be taken in sequence. Prereq: 3810, 2868, or consent of instructor. W, Sp

3960 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

4050 Matrix Algebra and Applications (3) Matrices, elementary operations, systems of linear equations, vector spaces, determinants, eigenvalues and eigenvectors. Prereq: 2850 or 2560 or consent of instructor. E

4060-70 Matrix Algebra and Applications (3, 3) Eigenvalues and eigenvectors, singular values and singular vectors, unitary and similarity transformations, quadratic forms, vector and matrix norms, Jordan canoncial form, and related topics. Prereq: 2860 or 4050. W

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

4150-60 Abstract Algebra (3, 3) Equivalence relations, properties of integers, elementary theory of groups and rings, polynomial rings, integral domains, divisibility, unique factorization domains, fields. May be taken in sequence. Prereq: 2860 or 4050. W; Sp

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

4235 Numerical Methods for Ordinary Differential Equations (3) Interpolation by polynomials, piecewise polynomials, quadrature, numerical and multiple-step and multi-step methods for differential equations. Stability, consistency, and convergence. Current algorithms, various algorithms and order; stiff systems. Boundary value problems. Prereq: 3150 or 3155 and 4620 or 4622. (Same as Computer Science 4235.) W; Sp


4250 Elementary Complex Variables (3) Complex numbers, Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula. Taylor and Laurent series applications. Prereq: 2860; one 4000-level mathematics course recommended. F, Sp, Su

4510-20-30 Introduction to Analysis (3, 3, 3) Real numbers, sequences and series, limits, continuity, uniform continuity, differentiation, integration. Functions of several variables, implicit function theory. Multiple integrals, sequences and series of functions, uniform convergence, Taylor series. Should be taken in sequence. Prereq: 2860. F, Sp; 2460. W

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

4550 Partial Differential Equations (3) Fourier series; Fourier integrals; orthogonal functions; the vibrating string, solution by series, heat flow, Bessel functions. Prereq: 2860. Recommended: 4610 or 4710. E


4640 Calculus of Finite Differences (3) Real difference equations, applications to problems in engineering and physics. Prereq or coreq: 4610.

4650-60-70 Introduction to Mathematical Statistics (3, 3, 3) Introduction to probability; discrete and continuous distributions; estimation, confidence intervals and hypothesis testing. Prereq: 2860. E, Sp; 2550. W

4710 Vector Analysis (3) Fundamental operations, basis vectors, dot and cross products, directional derivatives, divergence and curl of vector fields, line and surface integrals, vector calculus, Stokes's theorem. Prereq: 2860. E

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

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

4900 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study and faculty guidance. May be repeated. Maximum 9 hrs.

4990 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Recommendation of Mathematics Department faculty member and consent of department. Must be registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SNC only. E

5010 Elementary Functions from an Advanced Standpoint for Teachers (3-4) Order and completeness axioms of real numbers; limits of sequences, derivatives of functions; 'fundamental functions' of exponential, logarithmic and trigonometric functions; limits, continuity, singular perturbations, and asymptotic solutions. Maclaurin's series; applications to construction of logarithmic and trigonometric tables. Prereq: 3150 or 3110 or consent of instructor.

5012 Differentiation and Integration for Teachers (3-4) Advanced techniques applied to graphing functions. Curves, surfaces, parametrizations, singular points, tangents and osculating planes, calculus in space. Lengths, areas, arc length of curves in plane and curves on surface, curvature, torsion, asymptote, local coordinates, Frenet formulas. Prereq: 1 yr of calculus, or consent of instructor.

5013 Geometry for Teachers (3) Primarily for high school teachers of geometry. Historical and modern presentations of topics encountered in a high school geometry class: axioms, synthetic and metric; models: betweenness; congruence of segments and triangles; parallel postulate; similarity and area; ruler and compass constructions; Klein's Erlangen Program. Prereq: Consent of instructor.

5014 Analysis for Teachers (3) Functions of several variables, limits and continuity, partial derivatives, directional derivatives, gradients and divergence; implicit function theorem, maxima and minima, transformations. Prereq: 3510 or consent of instructor.

5015 Probability and Statistical Inference for Teachers (3) Probability distributions including binomial, hypergeometric, and Poisson; moment generating functions; expectation of continuous random variables; moment generating functions of uniform and normal distributions. Sampling including Chi-square, F, and t distributions, interval estimation of means and variances; simple hypothesis testing. Prereq: 1 yr of calculus and 3050 or consent of instructor.

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

5051 Introductory Business Mathematics (3) Graphing of simple equations, straight lines, circle, parabola, functions, algebra of functions, limits, continuity, derivatives, algebraic and transcendental functions, applications to maximization and minimization, convexity and concavity, implicit differentiation, higher order derivatives, and applications. Credit applicable only to *This course is intended for students in the Master of Mathematics program and for students in graduate programs in education. It may not be applied as graduate credit toward the M.A. or M.S. degree in Mathematics.

College of Liberal Arts
satisfy MBA core requirement. Prereq: Math 1550 or equivalent.

5052 Mathematics for Business Decisions (3) Ex-

5055 Finite Difference Methods for Partial Differential-

5110-20-30 Theory of Functions of a Complex Vari-

5150 Foundations of Analysis (3) Development of in-

5160 Foundations of Analysis (3) Propositional func-

5170 Foundations of Analysis (3) Linear continuum. 

5200-20-30 Application of Numerical Methods (3, 3, 3) Approximation and interpolation; least,squares, 

5210-20-30 Theory of Functions of a Real Variable 

5220 Introduction to Linear Algebra (3, 3, 3) Basic 

5220-Banach spaces, Riesz representation theorems, 

5225 Technical Writing (1) Provides students with 

5270 Stability Theory and Liapunov's Direct Meth-

5310-20-30 Introduction to Higher Geometry (3, 3, 3) Projective geometry; conics and quadrics. 

5316-20-30 Advanced Differential Equations I (3, 3, 3) Separable and non-separable first order equations, 

5330-20-30 Smooth Manifolds (3, 3, 3) Topological 

5340-20-30 Topological Spaces (3, 3, 3) Fundamen-

5354-60-70 Partial Differential Equations (3, 3, 3) Advanced topics in classical and modern theoretical 

5400-60-70 Advanced Theory of Functions (3, 3, 3) Distribution functions and mathematical expecta-

5405-60-70 Applied Group Theory (3, 3) Groups, 

5410-20-30 Modern Algebra (3, 3, 3) Intensive study 

5430-50-60 Introduction to Topological Spaces (3, 3, 3) Topological spaces; metric and normal linear 

5450-60-70 Topological Spaces (3, 3, 3) Topological 

5455-60-70 Topological Spaces (3, 3, 3) Topological 

5457-60-70 Topological Spaces (3, 3, 3) Topological 

5460-60-70 Topological Spaces (3, 3, 3) Topological 

5465 Finite Element Methods (3) Finite element me-

5470 Foundations of Analysis (3) Linear continuum. 

5475-60-70 Introduction to Topological Spaces (3, 3, 3) Topological spaces; metric and normal linear 

5476-60-70 Topological Spaces (3, 3, 3) Topological 

5477 Foundations of Analysis (3) Linear continuum. 

5478-60-70 Topological Spaces (3, 3, 3) Topological 

5490 Graduate Reading in Mathematics (1-3) Open 

5495 College of Liberal Arts 120
3820 Yeasts and Molds (3) Morphology, taxonomy, and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: 2910 or 3700, or consent of instructor. W

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

4110 Physiology of Bacteria (3) Modern concepts of bacterial physiology and metabolism including cell structures and function. Prereq: 3700 and 12 hrs of organic chemistry. With emphasis on quantitative and theoretical methods. Prereq or coreq: 3519. W

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

4120 Taxonomy of Bacteria (3) Bacterial classification. Prereq: 3700 and 3519, F

4140 Molecular Genetics (3) Transmission and expression of genetic information at the molecular level. Emphasis is on bacterial and viral systems, but unique features of eukaryotic genetic systems are included. Prereq: Bio/Chem 3100 or consent of instructor. Sp

4149 Techniques in Microbial Genetics (2) Practical experience in basic techniques in experimentation in microbial genetics. Coreq: 4140. Sp


4159 Experimental Microbial Ecology (3) Survey of techniques for assessment of microbial forms, functions, activities, and interactions in a variety of habitats. Prereq: 4140 or consent of instructor. 1 hr and 2 labs. Fall

4270 Immunology (3) Principles of inflammation and immunity, immunoglobulin structure and function, complement, hypersensitivities, cell cooperation in immune mechanisms, abnormalities of the immune system. Prereq: Biol 3120. [Same as Zoology 4270] F

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

4320 Pathogenic Bacteriology (3) Disease-producing microorganisms including bacteria, rickettsia, and chlamydiae. Prereq: 3519. Fall

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

4330 Medical Mycology (3) Disease-causing fungi; cytology, physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq: 4150-20. Coreq: 3700. Sp

4339 Medical Mycology Laboratory (2) Prereq: 3519, Coreq: 4330. Sp

4420 Molecular Virology (3) Molecular aspects of the replication, assembly and expression of viruses, with emphasis on bacteriophage. Prereq: 3700. F

4430 Medical Virology (3) General virology with emphasis on medical aspects. Prereq: 3700. W

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

5000 Thesis (1-15) E

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

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

5130 Topics in Taxonomy (3) Isolation, cultivation and taxonomic relationships of schizomycetes, emphasis upon less frequently encountered orders. Prereq: 3410, 3 labs.

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

5350 Advanced Microbiology for Secondary Education (4) Major bacterial populations encountered in nature, habitat, laboratory methods for isolation and characterization of naturally occurring microorganisms. Prereq: Consent of instructor and instructor in microbiology and general chemistry. Not for degree credit in microbiology.

5360 Topics in Immunology and Immunohematology (4) Molecular and cellular aspects of immunology; immunohematology; biochemistry; hemostasis. Theoretical and practical exercise in immunohematology. Prereq: 3720, Biochemistry 4110-20 or equivalent.

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

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. Prereq: Biochemistry 4110-20.

5730 Pathogenesis of Infectious Disease (3) Host response to infection. Derangement of host-microbe interaction stimulated by microbial invasion, extracellular and intracellular relations to virulence. Alteration of genetic and hormonal control systems resulting from progressive infection. Prereq: 4220.

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

5760 The Bacterial Viruses (2) Lectures and discussions dealing with viral diseases with emphasis on the biological and chemical consequences of bacteriophage infection. Prereq: 4430-45-46-47 supplemented by readings from literature. Prereq: 4420, Biochemistry 4110-20.

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

5820 Microbiology of Foods (3) Lectures and seminars dealing with current advances and selected topics in food microbiology. Prereq: 4110-20 or equivalent. Literature surveys and laboratory methods in food microbiology. Emphasis is on analytical methods, safety and preservation. Prereq: 3810, Biochemistry 4110-20. Recommended prereq: Food Technology 4420.

5850 Seminar in History of Microbiology (1) Microbiologists and their achievements from Pasteur to present. S/NC only.

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

6000 Doctoral Research and Dissertation (1-15) E

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

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

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

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

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

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

6370 Seminar in Mycology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E

6380 Seminar in Immunohematology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E
THE MASTER OF MUSIC PROGRAM

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

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 recital, (f) 6 hours in music history/literature, (g) 3 hours in recital, and (h) 3 hours in music electives.

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

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

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

WIND and PERCUSSION INSTRUMENTS: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in area literature, (c) 3 hours in music research, (d) 3 hours in advanced conducting, (e) 3 hours in music 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 history/literature, (e) 9 hours in thesis, and (f) 3 hours in electives.

Music Theory: 45 hours distributed as follows: (a) 12 hours in applied music, (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) 12 hours in conducting, (c) 6 hours in music history/literature, (d) 9 hours in thesis, and (e) 9 hours in electives.

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

THE MASTER OF ARTS PROGRAM

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

Musicology: 45 hours distributed as follows: (a) 21 hours in music history/literature, (b) 3 hours in music research, (c) 6 hours in 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.

THESE 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: 1191-1201, and keyboard 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: 3112 or consent of instructor.

1212 Orchestra (3) Advanced techniques in instrumental writing with emphasis on scoring for the concert orchestra. Prereq: 3112 or consent of instructor.

2303 The Concerto (3) Survey of literature from seventeenth century to present.

2304 The Symphony (3) Survey of symphonic literature from precursors of classical symphony to the present.

2860 Chamber Music (3) Survey of chamber music from 1750 to present.


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

3950 Evolution of Jazz (3) Study of origin, development and styles of jazz music and its exponents.

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

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

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

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

4060 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: Music Education 4440 or equivalent.

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


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

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

4114 Stage Band Arranging (3) Analysis of scores and scoring for the stage band. Prereq: 3112 and consent of instructor.
4115 Variation (3) Study and application of variation procedures. Prereq: 3123 or equivalent.

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

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

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

4210 Music in the Romantic Period (3) Survey of music from Beethoven through post-Romantic instrumental and vocal styles.

4230 Contemporary Music: 1945 to Present (3) Survey of music of the contemporary period. Prereq: Consent of department head.

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

4261-71 Introduction to Ethnomusicology (3, 3) Basic attitudes and techniques of ethnomusicology. Survey of music cultures through textbook, texts, Pacific, Near East and Asia. 4271—Africa, Europe and America.


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 fifteenth century to 1930.

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

4340-50 Works of Bach (3, 3) Detailed examination of sonatas, chamber, keyboard, and orchestral works; cantatas, motets, passions and oratorios. 4340—instrumental works; 4350—vocal works.

4400 Jazz Directing (1) Rehearsal techniques for jazz instrumentation. Prereq: Consent of instructor.

4480 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz and administering of jazz programs. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4500 Jazz Composition (3) Prereq: Music 4114 and consent of instructor.

4600 Advanced Improvisation (2) Emphasis on further development of individual skills and solving individual problems in jazz improvisation. Prereq: 3502-53.

5000 Thesis (1-15) E

5001 Choral Conducting Document (3) Analytical-critical history and analysis of choral music.

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

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

5012-22 Pedagogy of Voice (2, 2, 2) 5012—Survey of voice production processes in singing including: voice classification, quality, diction registral distribution, practice, and control. 5022—Examination of teaching materials, preparation of programs for various vocal categories and levels of study. Observation of studio teaching. 5052—Analysis of the vocal problems of a selected group of students. Supervised teaching. Prereq: 4012-22-32 or consent of instructor.


5030 Choral Literature Seminar (3) Topics vary.

5040 Vocal Literature Seminar (3) Topics vary.

5050 Graduate Recital (3)

5051 Opera Performance (3)

5052 Vocal Chamber Music Performance (3)

5053 Choral Conducting Performance (3)

5054 Lecture-Recital (3)

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

5057 Instrumental Conducting Seminar (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 4050 or equivalent.

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

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

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

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

5100 Independent Study in Music Theory (1-3) Prereq: Consent of department head.

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

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

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

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

5125 Practicum in Computers and Music Research (1) Programming languages, design and implementation of projects in musical analysis, composition and indexing. Prereq: Consent of instructor.

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

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

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

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

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

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

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

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

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

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

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

5500 Flute (1-4)

5505 Oboe (1-4)

5510 Bassoon (1-4)

5515 Clarinet (1-4)

5520 Saxophone (1-4)

5525 Horn (1-4)

5530 Trumpet (1-4)

5535 Trombone (1-4)

5540 Baritone (1-4)

5545 Tuba (1-4)

5550 Percussion (1-4)

5555 Voice (1-4)

5560 Violin (1-4)

5565 Viola (1-4)

5570 Cello (1-4)

5575 String Bass (1-4)

5580 Piano (1-4)

5585 Harpsichord (1-4)

5590 Organ (1-4)

5595 Guitar (1-4)

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

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

5600 Small Ensemble (1)

5602 Brass Choir (1)

5604 Jazz Ensemble (1)

5606 Trombone Choir (1)

5610 Percussion Ensemble (1)

5611 Marimba Choir (1)

5612 Baroque Ensemble (1)

5620 UT Singers (1)

5630 Chamber Singers (1)

5632 Collegium (1)

5634 Saxophone Choir (1)

5640 Opera Theatre (1)

5642 Opera Workshop (1)

5650 Concert Band (1)

5652 Campus Band (1)

5654 Varity 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 Chorale (1)

5699 Accompanying (1)

*May be repeated.

**May be repeated. Maximum 6 hrs.
Philosophy

MAJOR

Philosophy

DEGREES

M.A., Ph.D.

Professors:

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

Associate Professors:


Assistant Professors:

J. O. Bennett, Ph.D. Tulane; S. H. Cohen, Ph.D. Northwestern; K. A. Emmett, Ph.D. Ohio State; W. J. Fowkes, Ph.D. Northwestern; H. P. Hamin, Ph.D. Georgia; R. Jones, Ph.D. Chicago; M. L. Osborne, Ph.D. Tennessee; S. Rawn, Ph.D. California (Berkeley).

The MASTER'S PROGRAM

See general requirements on page 19.

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

THE DOCTORAL PROGRAM

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

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

Registration in any course in the 5000 or 6000 series (except 5500 and 5910-20-30) may be repeated for credit with the consent of the department. That is, courses having the same number, but with different subject matter, may be taken with each separate subject description.

MEDICAL ETHICS

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

RELIGIOUS STUDIES

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

3111 Ancient Western Philosophy (4, 4) F, W

3121 Medieval Philosophy (4) F, Sp

3131 Seventeenth- and Eighteenth-century Philo-

sophy (4) E

3141 Nineteenth- and Early Twentieth-century Phi-

losophy (4) F, Sp

3151 Contemporary Philosophy (4) Survey of recent

movements in philosophy. F

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

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

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

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

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

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

3430 Concepts of Woman (4) Examination of some of the theoretical foundations of feminism and anti-feminism. F, W, Sp

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

3510 Existentialism (4) E

3550 Marxism as Philosophy (4) W

3650 Philosophy and Religion in India (4) (Same as Religious Studies 3660.) F

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

3671 Religion and Philosophy in China (4) (Same as Religious Studies 3671.) F

3690 Philosophy of Religion (4) Analysis of basic issues of religion. (Same as Religious Studies 3690.) F, Sp, Su


3740-50 Conceptual History of Science (4, 4) 3740—The Scientific Revolution: historical evolution of thought in astronomy, mechanics and philosophy of nature up to Newton. 3750—The development and decline of Newtonian science: historical evolution of thought on the nature of matter and of light, and on that of life. Prereq: 8 hrs of physical science or consent of instructor. F, W

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

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

3910 Contemporary Aesthetics (4) Philosophical discussion of contemporary art. F, W, Sp

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

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

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

4370 Theoretical Issues in Medical Ethics (4) Prereq: 3310 or 3611 or consent of instructor. (Same as Religious Studies 4370.) Sp

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

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

4500 Continental Rationalism (4) Prereq: 8 hrs philosophy or consent of instructor. A

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

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

4800 Advanced Topics in Existentialism and Phenomenology (4) Prereq: 8 hrs philosophy or consent of instructor.


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

4610 Philosophical Analysis (4) Prereq: 8 hrs philosophy or consent of instructor.

4620 Philosophy of Mind (4) Problems of mind and body in relation to consciousness and personal identity. Prereq: 8 hrs philosophy or consent of instructor.

4630 Philosophy of Language (4) Prereq: 8 hrs philosophy or consent of instructor.

4710 Philosophy of Natural Science (4) Consideration of the scientific method and the epistemological assumptions and implications in various theories of logic. Prereq: 4510 or equivalent.

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

4810 Metaphysics (4) Prereq: 8 hrs philosophy or consent of instructor.

5000 Theology (1-15) E

5050 Symbolic Logic (4)

5080 Philosophy of Logic (4) Nature of logic; implications of the philosophical assumptions and implications in various theories of logic. Prereq: 4510 or equivalent.

5101 Foreign Study (1-12) See page 95. E

5102 Off-campus Study (1-12) See page 95. E

5103 Independent Study (1-12) See page 95. E

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

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


5355 Orientation to Medical Ethics (4) Survey of ethical theories in application to issues in medical ethics. (Same as Religious Studies in 5355.) F

5365 Applied Ethical Theory (4) Single author, tradition, or topic in ethical theory with special attention to application to issues to health, business, technology, ecology, and related practical fields. (Same as Religious Studies 5365.) W

5370 Topics in Medical Ethics (4) Prereq: 4370-71 or consent of Medical Ethics Committee.

5375 Clinical Practicum Orientation (4) Medical terminology, history of medical ethics; preparation for UT Center for the Health Sciences Clinical Practicum. Sp

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

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

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

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


5550-60 Philosophy of Science (4, 4) Nature of science, methods and metaphysics. 5550—Natural sciences. 5560—Social Sciences.

5610 Recent Developments in Philosophy of Religion (4)
have completed an undergraduate major in physics or its equivalent. Physics 3210-20-30, 3710-20-30 or 4110-20-30, 4210-20, 4230 or election from the minimum course work prerequisite to graduate study.

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

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

Departmental graduate programs providing special opportunities for academic 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 period.

THE MASTER'S PROGRAM

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

The thesis program is primarily designed for students intending to enter into industrial or governmental laboratories as physicists. The course requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4510-20-30, 5110-20-30, 5120-20-30, 5610-20-30 and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

The non-thesis program is primarily designed for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to use also in 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, 5310-20-30, 5410-20-30); 9 hours in a minor field (e.g., mathematics); and 9 hours from other courses in physics numbered above 4000 (preferably of advanced laboratory nature). In addition, the candidate must pass a comprehensive examination administered by the committee.

The Physics Department participates in the program leading to the Master of Arts in College Teaching degree. In addition to the requirements for either of the Master's programs described above, the MACT degree in Physics requires 15 more hours of credit, making a total of more than 60 quarter hours. Nine of these hours are specified as part of the minimum course work in a seminar course dealing with general problems of college teaching; 3 hours in a seminar course dealing with special problems in the teaching of physics; and 3 hours in a course dealing with the history and philosophy of physics. The other 6 hours of course work may be elected from the 240 courses listed below, or numbered above 5000. During the two-year program leading to the MACT degree, the candidate will be continually engaged in supervised teaching activities.

THE DOCTORAL PROGRAM

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

Research Associate Professor.

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 include the successful completion of: Physics 4510, 4610, 4620, 5110-20, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30, and either 6310 or 5720; Chemistry 4160, 5430, and any two quarters from 5450, 6730 or 6810-20.

Astronomy


Physics


3230 Heat and Thermodynamics (3) Concepts of temperature and heat, laws of thermodynamics, applications of laws to simple physical and chemical problems. Prereq: 2220 or 2330 and calculus; 3210-20 or consent of instructor. Sp, Su. Prereq: 2320-20 or 2210-20-30, and calculus; 3210 and 3220, 330. Labs

3610-20 Electronics (3, 3) Electronic components and circuits of interest to physicists. Prereq: 3110-
20-30 or 2210-20-30 and calculus . 3 labs . F, W, Su
4240-20-30 Advanced Modern Physics (3, 3, 3) Ex-
motion guided waves. Retarded potentials and gauge trans-
derivatives. Prereq: 4210-20. Prereq: 5210-20. Pre-
guiding currents; laws of electromagnetism; Maxwell's
and solids . Optical properties of electromagnetic
and molecules; oscillator strength, interaction of
and magnetic susceptibilities, high energy processes, scattering and
collision processes. Theory of fields. Prereq: 6110-20-30. May be repeated
with consent of department.
5610-20-30 Mathematical Methods in Physics (3, 3, 3)
Vector and tensor analysis; linear algebra, matrices, vector spaces; Fourier series and integrals; spherical harmonics; Bessel functions; integral transform functions and partition functions. Applications to gases, liquids and solids, including cluster theory of imperfect gases. Prereq: 5120-20, 5610-20-30, F, W, Su
5640 Numerical Methods in Physics (3) Numerical methods and methods for solving physical problems, pointed toward use of automatic computing ma
chinery; analysis of errors. Prereq: 5120-20, or consent of instructor. Prereq: 5640. F, W, Su
5720 Physics of Polyatomic Molecules (3) Introduction to electronic structure of molecules and physical processes of luminescence of these molecules; theoretical and experimental aspects of inter-
molecular and intramolecular electron excitation energy transfer and charge transfer; application of exciton energy transfer and charge transfer in
such field as organic molecular reactivity and or-
ganic scintillation. Prereq: 5210-20 or consent of instructor. Su
5910-20-30 Special Problems (3, 3, 3) A variety of
problems not covered in other courses. E
5911-31 Special Problems in the Teaching of Physics (1, 1) Design of physics experiments and development of laboratory materials for physics tests and examinations, techniques in pres-
entation of physics topics, and related problems. Prereq: consent of instructor. Required of MAC candidates.
6000 Doctoral Research and Dissertation (3-15) E
6110-20-30 Quantum Mechanics (3, 3, 3) Funda-
mental principles of quantum mechanics and prin-
cipal approximation methods. Applications to atomic, molecular and nuclear physics. Dirac equa-
tion; quantum electrodynamics. Prereq: 4130 or 5210, 5310-20-30 or 5410-20-30. Whichever of latter series not used as prerequisite is considered
corequisite. F, W
6210-20-30 Nuclear Structure (3, 3, 3) General prop-
erties of nucleus; two body scattering problems; saturation, exchange and pair interactions of nuclear forces; theory of light nucleus; nuclear spectroscopy; special nuclear models; theory of nuclear reactions; theory of reaction of bare-decay. Prereq: 6510-20-30. May be repeated with consent of department. Maximum 27 hrs. E, F, W
6310 Electromagnetic Theory of Light (3) Classical
electron theory including theories of the breadth, dispersion and absorption; scattering of light and x-rays, dielectric and magnetic properties of gases and solids. Optical properties of electromagnetic waves in sporic media including refraction, polarization and also theory of diffraction. Prereq: 5410-20-30. Su
6320 Special Relativity (3) Lorentz transformation; Einstein postulates; relativistic tensors; relativistic electromagnetics; relativistic electrodynamics. Prereq: 5120-20-30, 5410-20-30, 6310. F
6330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prereq: 6320. W
6420 Advanced Topics in Classical Theory (3) To meet special needs of students. Possible fields: advanced dynamics and hydrodynamics, electromagnetism of moving charges, statistical mechanics, including theory of nonequilibrium processes. Prereq: 5310-
20-30, 5410-20-30, 5510-20-30. May be repeated with consent of department.
6430 Advanced Topics in Quantum Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of blackbody radiation and blackbody radiation, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes. Theory of fields. Prereq: 6110-20-30. May be repeated with consent of depart-
ment.
6500-10 Electrical Conduction in Gases and Plasma Physics (3,3) Electrical conduction in gases at high and low pressures. Characteristics of spark, arc and glow discharge. Collective phenomena and plasma oscillation magnetohy-
dromynamics; instabilities. Topics of current interest in astrophysics, geophysics and thermionic re-
search. Prereq: 5110-20-30 and either 5410-20-30 or Electrical Engineering 5310-20-30. (Same as Electrical Engineering 6500-10.) F
W
6600 Interaction of Radiation with Gases (3) Inte-
teraction and experimental with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules; ioniza-
tion; critical phenomena; photoelectric effect; interaction, transport and capture; electron swarm and electron beam experiments. Prereq: or coreq: 6110-20-30. F
W
6620 Interaction of Electrons with Solids (3) Collis-
ions with free electrons; stopping power; electron slowing down spectra; energy straggling; nuclear scattering; electron diffusion; plasmon effects in ir-
radiated solids, techniques in electron spectroscopy, applications to dosimetry. Prereq or coreq: 6110-20. W

6630 Interaction of Radiation with Matter (3) Topics in atomic collision theory. Photon-atom interactions; electron-atom and electron-molecule collisions, dielectric theory, stopping power, collective excitation of electronic systems, Cherenkov radiation, electron transport in gases and solids. Prereq or coreq: 6110-20. 3


6810 Vibration Problems in Molecular Spectra (5) Normal coordinates and potential functions; group theoretical methods and selection rules in gases and condensed phases. Laseraman spectroscopy and nonlinear electronic phenomena. Prereq: 5420 or equivalent. (Same as Chemistry 6810.)

6820 Molecular Vibration-Rotation Theory (3) Molecular vibrations and rotating systems possessing specific symmetry properties, quantum mechanical theory of symmetric and asymmetric molecules, vibrations including vibration-rotation interaction theory, intensities and energies of molecular transitions; methods of analysis used in high resolution molecular spectroscopy. (Same as Chemistry 6820.)

Political Science

MAJORS DEGREES

Political Science M.A., Ph.D.
Public Administration M.P.A.

Professors: T. Ungs (Head), Ph.D. Iowa; R. S. Avery (Emeritus), Ph.D. Northwestern; D. H. Carlisle, Ph.D. North Carolina; L. S. Greene* (Emeritus), Ph.D. Wisconsin; R. R. Iredell, Ph.D. Chicago; D. D. Nimmo, Ph.D. Vanderbilt; H. Plass, Ph.D. Utah; N. M. Robinson, Ph.D. Syracuse; O. H. Stephens, Ph.D. Johns Hopkins; D. M. Welborn, Ph.D. Texas.

Associate Professors: R. D. Cunningham, Ph.D. Indiana; J. Dodd, Ph.D. Tulane; A. Elliott, Ph.D. Columbia; G. Evans, Ph.D. Columbia; A. H. Hopkins, Ph.D. Syracuse; W. Lyons, Ph.D. Oklahoma; R. L. Peterson, Ph.D. Yale; G. J. Reibstein, Ph.D. Michigan State; T. M. Simpson, Ph.D. Johns Hopkins; T. A. Smith, Ph.D. Ohio State.

Assistant Professors: W. Fierman, Ph.D. Harvard; M. R. FitzGerald, Ph.D. Pennsylvania; P. K. Freeman, M.A. Wisconsin-Milwaukee; R. A. Gorman, Ph.D. New York; S. M. Neusse, Ph.D. Texas.

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

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of preparing and coordinating governmental administration through research, publication, and consultation. The staff is as follows: Professor Ungs (director); Professors Lyons, FitzGerald, Evans, and Freeman (assistant professors); Research Associates Durant and Koehler.

THE MASTER’S PROGRAM

See general requirements on page 19.
4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4610 Budgetary Process (4) Fiscal planning, budget and expenditure processes in government; their policy and administrative implications. W or Sp.

4620 Public Personnel Administration (3) Development of the merit system in government; career systems, public personnel management functions, organization for personnel management. F or W.

4665-56 Policy Making in Democracies (4, 4) Comparative approach to theory and process of making public policies. For Sp; W.

4725 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4701-02 International Organization (4, 4) The League of Nations and the United Nations. F or W.

4771 International Law (4)

4727 Politics of Inter-American Relations (4) Functional and regional organizations. W or Sp.

4780-84 Policy Making in Democracies (4, 4) Comparative approach to theory and process of making public policies. For Sp; W.

4785-86 Politics of Inter-American Relations (3, 3) Analysis of selected theoretical and policy issues.

4800-86 Politics of Inter-American Relations (3, 3) Analysis of selected theoretical and policy issues.

4810-12 Politics of Inter-American Relations (3, 3) Analysis of selected theoretical and policy issues.

4940 Politics and the Environment (4) Examination of selected theoretical and policy issues.

4975 Special Topics in Political Thought (4) May be repeated with consent of department. Maximum 8 hrs.

5000 Theories of Political Thought (4) May be repeated with consent of department. Maximum 8 hrs.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student intends to take no course or no faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N or C.

5010 Foreign Study (1-12) See page 95.

5012 Off-Campus Study (1-12) See page 95.

5101 Independent Study (1-12) See page 95.

5101-20 Seminar in Political Theory (3, 3) Selected topics dealing with political problems of less developed societies.

5125 Seminar in Comparative Government and Politics (3, 3) Special topics in modern governments.

5140 Seminar in Latin American Government (3, 3) Special topics in Latin American government.


5140-20 Seminar in Latin American Politics (3, 3) Analysis of selected topics dealing with political problems of less developed countries.

5170-20 Seminar in Soviet Politics and Government (3, 3) Analysis of selected topics dealing with political problems of less developed countries.

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

5270 Seminar in the Politics of Development (3) Selected topics in quantitative political analysis.

5270-25 Seminar in Comparative Government and Politics (3, 3) Special topics in comparative government and politics.

5310-20 Seminar in Comparative Government (3, 3) Special topics in comparative government and politics.

5400-50 Seminar in Constitutional and Administrative Law (3) Special topics in constitutional and administrative law.

5440-50 Theory and Analysis of U.S. Foreign Policy Processes (4, 4) Special topics in the analysis of foreign policy-making processes.

5510 Seminar in International Organization (3, 3) Selected topics in international organization.

5540 Seminar in Comparative Public Administration (3) Special topics in comparative public administration.

5550 Seminar in Administration in Developing Countries (3) Special topics in administration in developing countries.

5600 Seminar in Public Administration (3) Special topics in public administration.

5605 Seminar in Public Administration (3) Special topics in public administration.

5610 Seminar in Organization Theory (3, 3) Analysis of major theories of organization and their applicability to public sector.

5611-21 Seminar in State and Local Administration (3, 3, 3) Special topics in state and local administration.

5630 Seminar in Technology and Public Policy (3) Special topics in technology and public policy.

5640 Seminar in Comparative Public Policies (3) Special topics in comparative public policies.

5641 Seminar in Contemporary Public Policies (3) Special topics in contemporary public policies.

5670 Seminar in Policy Analysis (3, 3) Special topics in policy analysis.

5710 Seminar in the Politics of Administration (3) Special topics in the politics of administration.

5720 Seminar in Research and Dissertation (3-15) Special topics in research and dissertation.

5740 Seminar in Organizational Analysis (3) Special topics in organizational analysis.

5750-65 Seminar in Public Management (3, 3) Special topics in public management.

5765-75 Law and the Administrative Process (3, 3) Special topics in law and the administrative process.

5770 Practicum in Public Administration (3) Special topics in public administration.

5785-86 Seminar in Staff Functions (3, 3) Special topics in staff functions.

5800 Seminar in Governmental Administration (3) Special topics in governmental administration.

5810 The American Political Process (4) Special topics in the political process.

5820 The American Political Process (4) Special topics in the political process.

5840 Ethics, Values, and Morality in Public Administration (3) Special topics in ethics, values, and morality in public administration.

5860 Seminar in Comparative State Politics (3) Special topics in comparative state politics.

5910-20 Quantitative Political Analysis (3, 3) Special topics in quantitative political analysis.

5993 Topics in Quantitative Political Analysis (3) Special topics in quantitative political analysis.

6100 Doctoral Research and Dissertation (3-15) Special topics in research and dissertation.

6120 Advanced Studies in International Politics (3) Special topics in international politics.

6130 Advanced Studies in Political Theory (4) Special topics in political theory.

6140 Advanced Studies in International Organizations (3) Special topics in international organizations.

6440 Advanced Studies in Comparative Politics (3) Special topics in comparative politics.

6510-20 Advanced Studies in American Constitutional Law (3) Special topics in American constitutional law.

6610-20 Advanced Studies in Public Administration (3) Special topics in public administration.

6710 Directed Research in Political Science (3) Special topics in political science.

6810-20 Advanced Studies in the Political Process (3, 3) Special topics in the political process.

6830 Seminar in Political Science (3) Special topics in political science.

6910 Seminar in Political Theory (3) Special topics in political theory.

7010 Seminar in Political Theory (3) Special topics in political theory.

7122 Seminar in Political Organizations (3) Special topics in political organizations.

7210 Seminar in Political Theory and Policy (3) Special topics in political theory and policy.

7310 Seminar in Political Theory (3) Special topics in political theory.

7410 Seminar in Political Science (3) Special topics in political science.

7510 Seminar in Political Science (3) Special topics in political science.

7610 Seminar in Political Science (3) Special topics in political science.

7710 Seminar in Political Science (3) Special topics in political science.

7810 Seminar in Political Science (3) Special topics in political science.

7910 Seminar in Political Science (3) Special topics in political science.

8010 Seminar in Political Science (3) Special topics in political science.

8110 Seminar in Political Science (3) Special topics in political science.

8210 Seminar in Political Science (3) Special topics in political science.

8310 Advanced Studies in Political Theory (4) Special topics in political theory.

8410 Advanced Studies in Political Theory (4) Special topics in political theory.

8510 Advanced Studies in Political Theory (4) Special topics in political theory.

8610-20 Advanced Studies in Public Administration (3, 3) Special topics in public administration.

8710 Directed Research in Political Science (3) Special topics in political science.

8810-20 Advanced Studies in the Political Process (3, 3) Special topics in the political process.

8910 Seminar in Political Science (3) Special topics in political science.

9010 Seminar in Political Science (3) Special topics in political science.

9110 Seminar in Political Science (3) Special topics in political science.

9210 Seminar in Political Science (3) Special topics in political science.

9310 Seminar in Political Science (3) Special topics in political science.

9410 Seminar in Political Science (3) Special topics in political science.

9510 Seminar in Political Science (3) Special topics in political science.

9610 Seminar in Political Science (3) Special topics in political science.

9710 Seminar in Political Science (3) Special topics in political science.

9810 Seminar in Political Science (3) Special topics in political science.

9910 Seminar in Political Science (3) Special topics in political science.
The Psychology Department emphasizes doctoral degree programs with specializations in clinical, school, community, developmental, and health psychology. These programs include experimental, cognitive, physiological, and comparative psychology, psycholinguistics, psychometrics, and learning. Some students complete a Master's degree as part of their doctoral program.

For detailed information on graduate programs and admissions requirements write: Graduate Secretary, Department of Psychology, University of Tennessee, Knoxville, Tennessee 37916.

THE PSYCHOLOGICAL CLINIC

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

4107 Experience in Individualized Instruction (1-6)
Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

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

4230 Sensory Processes and Perception (4) Survey of perceptual processes with emphasis on audition and vision. Prereq: 3150. Recommented: 2520. F

4239 Laboratory in Sensory Processes and Perception (3) Pre or coreq: 4230. F, W, Sp

4460 Organizational-Industrial Psychology (3) Course taken for credit by students who have credit for Management 3460. E

4510 Personality Theories (4) Prereq: 3650. F, Su

4610 Group Processes (3) Study and experience of theory and techniques of group processing and facilitation. Those participating in 4610 are expected to continue into 4620 and 4630. Prereq: 3616-16 and consent of instructor. F

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

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

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

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

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

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

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

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

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

4830 History and Systems of Psychology (4) Prereq: 9 hrs of upper division psychology.

4850 Learning Theories (4) Historical and theoretical foundations of learning models. Prereq: 5210. F

4860 Programmed Learning (3) (Same as Curriculum and Instruction 4860.)

4870 Contemporary Research in Behavior (4) Study of interaction of cultural and biological factors in determining the behavior of women, with emphasis on physiological mechanisms involved. Sp

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

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

5000 Thesis (1-15) E

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

5017 Colloquium in Experimental Psychology (1) Coreq: 5016. S/NC only. F

5019-29-39 Laboratory Techniques in Experimental Psychology (3, 3, 3) Required of all first-year students in experimental, physiological, and comparative psychology. Coreq: 5017. S/NC only. F, W; Sp

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

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

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

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

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

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

5112-13-14 Seminar in Current Issues in School Psychology (1, 1, 1) Historical, legal, ethical, and technological issues in practice of school psychology. Multiple instructors. (Same as Educational Psychology 5111-12-13.) S/NC only. F; W, Sp

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

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

5170-80-90 Seminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 5170-80-90.) F, W; Sp

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

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

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

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

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

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

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

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

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

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

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

5310 Field Work in School Psychology: Level I (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to doctoral program in school psychology who are assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 5319; S/NC only. F, W, Sp)

5320 Behavioral Interventions (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Focuses on interventions by people in community (teachers, supervisors, clinician) for control of deviant acts in community settings.

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

5350-60-70 Seminar in Psychology (3, 3, 3) S/NC only. E

5400 Psychophysics and Scaling Methods (3) Prereq: Consents of instructor. S/NC only. E

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

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

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

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

5510 Instrumentation for Psychological Research (3)

5520 Theory of Measurement (3) Reliability, validity, scaling and scaling, testing and retesting, and constructing tests into batteries. Prereq: 1 qtr of graduate-level statistics and 5500 or consent of instructor.

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

5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, differential psychology, comparison of different populations in specific psychological parameters, individual choice behavior, and testing of psychological hypotheses in human and animal behavior; reliability theory and regression theory. Prereq: Calculus 2 or equivalent.

5550 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: 3120. May be used for credit in psychology.

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

5580 Theories of Personality (3)

5581-82-83 Clinical Psychology I: Human Development and Personality (3, 3, 3) Core of doctoral program in clinical psychology. Students take 3 2-hr courses concurrently, each...
5890 Counseling Theories and Techniques (3) (Same as Educational Psychology 5890.)

5950-60 Theory and Practice of Consultation (3, 3) Issues in consultation, models of consulting process, and evaluation of consultation techniques. Must be taken in sequence. Coreq: 5595-90 and consent of instructor. (Same as Educational Psychology 5950-60.) W; Sp

5959-69 Practicum in Consultation (2, 2) Coreq: 5590-60. Must be taken in sequence. (Same as Educational Psychology 5959-69.) S/NC only. W; Sp

6000 Doctoral Research and Dissertation (3-15) E

6050 Seminar on Methods of Social Research (3) (Same as Sociology 5000.)

6100 Seminar in Community Psychology (3) Evaluation, research, intervention, and systems for delivery of services in communities. Prereq: 5702 and consent of instructor.

6150 Seminar in Program Evaluation (3) Techniques for designing and conducting research to evaluate effectiveness of programs. Prereq: Statistics 5050-60-70 or consent and equivalent of instructor.

6210-20-30 History, Systems, and Theories in Psychology (3, 3, 3) Prereq: M.A. in psychology or equivalent.

6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 6250-60-70.)

6280-90 Factor Analysis (3, 3) Factor analysis; component analysis; introduction to latent structure analysis. Prereq: 4640 and 5500.

6320 Seminar in Research Methods (3)

6330 Seminar in Learning (3)

6340 Seminar in Developmental Psychology (3)

6350 Seminar in Thinking (3)

6360 Seminar in Sensation and Perception (3)

6370 Seminar in Theoretical Psychology (3)

6380 Seminar in Industrial and Organizational Psychology (3) (Same as Management 6380.)

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

6395 Seminar in Assessment (3) Seminar for advanced graduate students in clinical psychology, to deal with current research on methods of evaluating the status of individuals seeking clinical aid.

6400 Seminar on Changing Concepts in Clinical Psychology (3) New developments in field in relation to their impact on experimentation and systems of thought. Prereq: M.A. in psychology or equivalent.

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

6410-20-30 Psychotherapy (3, 3, 3) Theories and principles of psychotherapy. Coreq: 5580-90. Prereq or coreq: 5590-60. W; Sp

6411-12-13-14 Psychotherapy: Elective Concentration Learning Laboratory (2, 2, 2, 2) Typically four psychotherapy concentration areas offered each quarter: Clinical students in core psychotherapy sequence must elect at least one of these in each quarter of sequence. May be repeated. Limited to clinical psychology students enrolled in core psychotherapy sequence or consent of instructor.


6450-60 Advanced Psychometrics (3, 3) Construction and standardization of psychological tests, questionnaires, and rating scales; theory of errors or measurements; item analysis, scaling, equating, and norms development. Prereq: 4650, 5440, and 5500. May be repeated. Maximum 9 hrs.

6490-23-34 Field Placement in Psychological Measurement Levels 2, 3, 4, 1-4, 1-4, 1-4, 1-4 Supervised clinical experience. Required of and limited to students fully admitted to Ph.D. program in Clinical Psychology. May be repeated. Maximum 8 hrs per course. S/NC only. W; Sp; F

6500 Seminar in Psychometrics (3) Seminar for advanced graduate students in psychometrics or quantitative psychology, to deal with advanced theories, methodologies, and their applications. Prereq: 4640, 5500 or equivalent, and consent of instructor. May be repeated. Maximum 9 hrs.

6550 Seminar in Advanced Social Psychology (3) Prereq: Consent of instructor.

6575 Seminar in Mental Health Administration (3) Theory and problems in organization and management of mental health administration.

6580-60-70 Systems Approaches in Psychological Sciences (3, 3, 3) Prereq or coreq: 5550-60. W; Sp; F

6590 Counseling Theories and Techniques (3, 3) (Same as Educational Psychology 5890.)

6659-69-79 Practicum in School Psychology III (2, 2, 2) Third year School Psychology Program practicum core sequence. (Same as Educational Psychology 6659-69-79.) S/NC only. W; Sp

6710 Seminar in Physiological Psychology (3)

6720 Seminar in Comparative and Ethological Psychology (3)

6730 Seminar in Ethological and Naturalistic Research (3) Coreq: 5550-60. W; Sp; F

6750 Ethological Psychology (3) Evolutionary and physiological basis of comparative psychology and implications for human behavior. Prereq: Introductory biology and graduate standing.

6760 General Vertebrate Neuroanatomy (3) Lecture and lab; survey of nervous system with structure and function of central and peripheral nervous system. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 6750.)

6790 Biological Psychology (3) Evolutionary and physiological basis of comparative psychology and implications for human behavior. Prereq: Introductory biology and graduate standing.

6798 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory procedures central to research in physiological psychology. Prereq: 4710, 4719, and consent of instructor. May be repeated with consent of instructor.

6800 Neural Basis of Behavior (3) Neuroanatomy and psychophysiology of the nervous system. Prereq: Consent of instructor. Offered in alternate years. Sp, A

6860 Seminar on Changing Concepts in Clinical Psychology (3) Seminar for students in clinical psychology. Prereq: Consent of instructor. Meets 3 hrs per week. Sp

6870 Forensic Psychology (3) Psychologist's role in relating psychological and medical findings to questions concerning licensure requirements, legal restrictions, and testimony as expert witness. Offered in alternate years. Prereq: M.A. in psychology or equivalent.

6890 Psychopharmacology (3) Review and evaluation of pharmacology as it relates to psychology. Prereq: Consent of instructor. Offered in alternate years. Sp, A

5500 Ethics in Professional Psychology (2) Review of basic ethical concerns in professional psychology. Multiple instructors. Meets 3 hrs per week. Sp

5519 Research in Health and Allied Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture; topic and format to be announced. Prereq: Permission of degree in field related to mental health or consent of instructor. May be repeated. Maximum 9 hrs.

5540 Student Appraisal (3) (Same as Educational Psychology 5840.)

5580 Psychological Techniques Laboratory (2) Basic techniques of psychological appraisal. Review of pharmacology as it relates to psychology. Multiple instructors. Meets 3 hrs per week. Sp

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

5591-92-93 Clinical Psychology I: Patterns of Adaptation (2, 2, 2) Second quarter core of doctoral program in clinical psychology. Clinical students take 2 2-hr courses concurrently, each covering content area from one of three major contemporary points of view.

5610-20 Clinical Psychology I: Behavioral Deviance and Psychopathology (2, 2, 2) Third quarter core of the doctoral program in clinical psychology. Clinical students take 2 2-hr courses concurrently, each covering content area from one of three major contemporary points of view.

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

5650-20 Speech Pathology (3) (Same as Speech Pathology 5650.)

5700 Community Psychology (3) Psychological aspects of research, evaluation, and planning in communities. Community ecology, systems for primary and secondary prevention, planning of social systems, and relevance of federal policies. Prereq: Consent of instructor.

5713 Learning Modules for Techniques in Professional Psychology (1-4) Set of learning packages, each designed to develop skills in assessment, therapy, child psychology, or pathology. Prereq: Consent of instructor. May be repeated. S/NC only.

5720 Community Psychology (3) Psychological aspects of research, evaluation, and planning in communities. Community ecology, systems for primary and secondary prevention, planning of social systems, and relevance of federal policies. Prereq: Consent of instructor. Offered in alternate years. Sp, A

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 lab; survey of nervous system with structure and function of central and peripheral nervous system. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 6750.)

5768 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory procedures central to research in physiological psychology. Prereq: 4710, 4719, and consent of instructor. May be repeated with consent of instructor.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) (Same as Speech Pathology 5790.)

5800 Seminar in Language and Communication Disorders (3) Prereq or coreq: 5590-60. F; Sp

5810 Seminar in Experimental Psychophysics (3) Prereq or coreq: 5590-60. F; Sp

5819 Practicum in Techniques of Psychological Examination (3) Prereq: 5810.

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

5840 Psychological Techniques Laboratory (2) Basic techniques of psychological appraisal. Review of pharmacology as it relates to psychology. Multiple instructors. Meets 3 hrs per week. Sp


5859-69 Practicum in Psychological Appraisals (2, 2, 2) Ordinarily to be taken concurrently with 5850-60-70.

Note: Psychology 5210-5300, 5590-60-70, 5819, 6310-400, 6419-29-39, 6719-20-30, and/or 6900 may be repeated for credit with the approval of the department.
Religious Studies

Professors: F. S. Lustby (Head); B. D. Colgate-Rochester; D. L. Dungan; T. H. D. Harvard; R. V. Norman, Jr.; P. H. Ph.D. Yale; C. H. Reynolds; Ph.D. Harvard.

Associate Professors: W. L. Humphreys; Ph.D. Union; D. E. Linge; Ph.D. Vanderbilt.

Assistant Professors: R. R. Earl; Ph.D. Vanderbilt; J. Kim; Ph.D. Chicago.


An M.A. in Philosophy with a concentration in religious studies is available for graduate work in these related fields. (Details of this program are available in the office of either department.) Graduate courses in religious studies further provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

3060-70-80 History of Western Religious Thought and Institutions (3, 3) 3060—First Century to Fifth Century. 3070—Sixth Century to Fifteenth Century. 3080—Sixteenth Century to 1900. (Same as History 3040-70-80.)

3210 Early Greek Mythology (3) (Same as Classics 3210.) F

3220 Early Greek Mythology in the Classical Period (3) (Same as Classics 3220.) W

3230 Roman Mythology (3) (Same as Classics 3230.) Sp

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

3411-12-13 Renaissance and Reformation (3, 3, 3) (Same History 3411-12-13.)

3440 Religion of Primitive Peoples (3) (Same as Anthropology 3440.)

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

3660 Buddhist Philosophy and Religion (4) (Same as Philosophy 3660.) W

3671 Religion and Philosophy in China (4) (Same as Philosophy 3671.)

3690 Philosophy of Religion (4) (Same as Philosophy 3690.)

4111-21 Modern Religious Philosophies (4, 4) Examination of the religious implications of major thinkers and movements. 4111—Nicolas de Cusa to Hume, 4121—Kant and the nineteenth century. Pre-req: 9 hrs of philosophy other than logic. (Same as Philosophy 4111-21.)

4210 Topics in Ancient Israelite and Ancient Near Eastern Religions (4) Pre-req: 3110-20 or consent of instructor. May be repeated. Maximum 8 hrs.

4310 Jesus and Paul Compared (4) Jesus' teaching and activity in the context of first-century Palestinian Judaism; analysis of what the Apostle Paul made of the tradition of and about Jesus. Recommended pre-req: 2810 or 2611.

4370 Theoretical Issues in Medical Ethics (4) (Same as Philosophy 4370.)

4410 American Religious Thought (4) Selected figures, movements and problems in American religious thought from colonial period to present.

4450 Topics in American Religion (4) Pre-req: One of the following: 3510, 3520, 4410, or consent of instructor. May be repeated. Maximum 8 hrs.

4540 Topics in Early Christianity and Hellenistic Religions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4570 Topics in Eastern Religions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: 3560-60. May be repeated. Maximum 12 hrs.

4590-20-30 Readings and Research in Religious Studies (3-4, 3-4, 3-4)

4594 Readings in Selected Languages Related to Religious Studies (3-4) Pre-req: Consent of instructor. May be repeated. Maximum 12 hrs.

4940 Sociology of Religion (4) (Same as Sociology 4940.)

4950 Theory of Religion (4) Elements for construction of a theory of religion drawing on resources from fields of psychology, sociology, religious studies, cultural anthropology, theology and comparative religion.

4960 Tradition, Change and Modernity in Asia (4) Comparative study of processes of religious and social change seen in historical context in Asian societies. Comparative focus of course will vary each year (e.g., China and Japan, India and South Asia). May be repeated. Maximum 8 hrs. (Same as Sociology 4960.)

5101 Foreign Study (1-12) See page 95.

5102 Off-campus Study (1-12) See page 95.

5103 Independent Study (1-12) See page 95.

5310-20 Topics in Religion and Society (4, 4)

5355 Orientation to Medical Ethics (4) (Same as Philosophy 5355.)

5365 Applied Ethical Theory (4) (Same as Philosophy 5365.)

5510-20 Topics in the History of Religion (4, 4)

5710-20 Topics in Religious Thought (4, 4)

Romance Languages

MAJORS

DEGREES

M.A. French

M.A. Spanish

Professors: H. C. Rutledge (Head); Ph.D. Ohio State; W. R. Averett (Emeritus); A.M. Texas; E. P. Barrett; Ph.D. Columbia; D. W. C. Cob; Ph.D. Tulane; P. J. Cooper; Ph.D. Columbia; E. J. R. Crago; Ph.D. Princeton; E. H. Waldow; Ph.D. Minnesota; F. D. Maurino; Ph.D. Columbia; A. M. Vazquez-Biggi; Ph.D. Minnesota; A. H. Wallace; Ph.D. North Carolina.

Associate Professors: W. F. Byess (Emeritus); Ph.D. Wisconsin; R. M. DeRichey; Ph.D. Illinois; J. C. Elliott; A.M. Illinois; W. H. Helfin; Ph.D. Florida State; K. D. Levy; Ph.D. Kentucky; M. P. Petrovskaya; Ph.D. Moscow; C. Pinsky; Ph.D. California (Berkeley); Y. M. Washburn; Ph.D. North Carolina.

Assistant Professors: T. R. Arrington; Ph.D. Kentucky; E. J. Campion; Ph.D. Yale; M. Handler; Ph.D. Florida.

The Department of Romance Languages offers three advanced degrees: the Master of Arts in College Teaching (M.ACT) in the Romance Languages only; the Master of Arts (M.A.) in French and Spanish; and the Doctor of Philosophy (Ph.D.) in Spanish.

THE MASTER OF ARTS IN COLLEGE TEACHING PROGRAM

This program requires a minimum of 60 hours of graduate work. Students must participate in the graduate seminar in college teaching during their first year of residence (3 hours credit). They must also complete 6
hours in supervised instructional experience. French or Spanish must be selected as the major subject, and at least 36 hours of graduate course work, including 9 hours of thesis and 9 hours of linguistics and philology, and 3 hours of problems in language teaching, must be completed. In addition, civilization courses are strongly recommended. Spanish or French must be selected as the minor subject, in which at least 18 hours of graduate work must be completed.

THE MASTER OF ARTS PROGRAM

The student may select either Plan A or B:

Plan A

1. Completion of a minimum of 36 quarter hours of which 24 must be taken in courses numbered above 5000, including 5011 (French or Spanish, as appropriate).
3. A written examination covering the course work and selected items from a master reading list.
4. A final oral examination covering the thesis.

Plan B

1. Completion of 45 quarter credits of which 33 must be in courses beyond 5000, including 5011 (French or Spanish, as appropriate).
2. Three term papers that have been accepted as satisfactory by the Advisory Committee.
3. A written examination covering the course work and selected items from a master reading list.

THE DOCTORAL PROGRAM

Residence and Course Work:

Completion of at least three consecutive quarters of full-time residence, a minimum of 81 credit hours in course work beyond the Bachelor's degree or its equivalent, and a dissertation (36 credit hours).

No less than 54 quarter hours should be taken in courses pertaining to the student's major field; of these a minimum of 18 hours are to be taken in courses above 6000, a maximum of 12 hours may be taken in courses of the 4000 level and the rest in courses above 5000. All students must complete the series in methods of research (5151-61-71) for a total of 3 credits. The minor subject course work, including 9 hours of which at least 12 hours must be numbered above 5000 and the rest above 4000, and should represent a meaningful complement to the student's area of concentration. In addition 9 hours of courses above 4000 in a related discipline are required. In special cases the latter requirement may be waived in favor of additional course work in the major field.

Language Requirements:

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

Examinations:

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

For additional information on the program, consult pages 8-9.

Arabic

3510-20 Intermediate Modern Standard (4, 4) A
3610 Islamic Literature in English Translation (4) A
Survey from origin to modern period of major Islamic literatures, especially Arabic, Persian, and Turkish. Readings include The Arabian Nights, the Rubaiyat of Omar Khayyam and Gibran's The Prophet. A
5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) Same as Spanish 5070-80-90 A
5101 Foreign Study (1-12) See page 95. E
5102 Off-campus Study (1-12) See page 95. E
5103 Independent Study (1-12) See page 95. E

French

3019-20-30 Elements of French for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for those having had Elementary French. No auditors. F; W; Sp; Su
4101 Masterpieces of French Literature in English Translation (3) No foreign language credit. A
4201 Works of Fourteenth Century (3) No foreign language credit. A
4110-20-30 French Literature of the Seventeenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4150 Theatrical French (1-3) Performance in one or more French plays. Prereq: intermediate French or equivalent and consent of instructor. May be repeated with consent of department. A
4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. F; W; Sp
4210 Phonetics (3) Prereq: 2190, 2520, or equivalent. F
4220-30 Advanced Grammar (3, 3) Prereq: 2190, 2520, or equivalent. W, Sp
4250 Introduction to Descriptive Linguistics (3) Phonetics, phonology, morphology and syntax. Types of languages, linguistic groups, dialects and dialect geography. Application of descriptive linguistics—field linguistics, dialect study, its practical use in learning languages and in language teaching. Introduction to transformational grammar. Prereq: 9 hrs of upper division English or 9 hrs of upper division courses in a modern or ancient language (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 German and Spanish 4250.) F
4260 Introduction to Historical and Comparative Linguistics (3) Same as German, Russian, and Spanish 4260.) W
4270 Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into the major Romance languages. (Same as Spanish 4270.) Sp
4310-20-30 French Literature of the Eighteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4350-60-70 Medieval French Literature (3, 3, 3) Medieval works in modern French texts. Prereq: Intermediate French or equivalent. A
4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent. A
4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4640-50-60 French Literature of the Sixteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SNCO only. E
5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. Intensive course in explication de texte. F
5101 Foreign Study (1-12) See page 95. E
5102 Off-campus Study (1-12) See page 95. E
5103 Independent Study (1-12) See page 95. E
5110-20-30 Old French (3, 3, 3) Medieval French language and literature. A
5121 College Teaching of Romance Languages (3) Seminar in demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by department. F
5151-61-71 Bibliography and Methods of Research (1, 1, 1) Same as Italian and Spanish 5151-61-71. SNCO only. E
5210-30-30 French Literature of the Sixteenth Century (3, 3, 3) A
5310-20-30 French Directed Readings (3, 3, 3) E
5350-60-70 The Philosophes (3, 3, 3) Textual analysis of the works of Voltaire, Diderot, Rousseau, and other eighteenth-century writers. A
5410-20-30 The French Novel (3, 3, 3) A
5450-60 Lyric Poetry of the Nineteenth Century (3, 3) A
5450-60 German and English influences on French Romanticism and generation of the poets of "le mal du siecle." 5460—Victor Hugo; the Parnassians. A
5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and petits poemes en prose with emphasis on theories of color and "correspondances" and their influence on Symbolist school. A
5510-20-30 The French Drama (3, 3, 3) From Seventeenth Century to present. Emphasis on Seventeenth Century. A
5610-20-30 Trends in Contemporary French Literature (3, 3, 3) A
5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories. A
5760 Problems in Romance Linguistics (3) Topics vary. May be repeated with consent of department. Prereq: 4250 or equivalent. (Same as Spanish 5650.) A
5710-20-30 Seminar in French Literature (3, 3, 3) Topics vary. May be repeated with consent of department. Su
5910 Literary Criticism: The Foundations of Romanticism (3) Same as Spanish 5910.) A
Italian

3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian or equivalent. A
3310-20-30 Italian Literature in English Translation (3, 3, 3) 3310—Sicilian School, the Florentine School, Dante, Petrarch (Italian, French, Dutch, Maimonides, Ariosto, Tasso. 3320—From the Baroque through the eighteenth century, comedia dell'arte, Vico,
4410 Educational Sociology (3) (Same as Curriculum and Instruction 4410.)

4530 Community Organization (4) Structure, function, linkage, change and development and important community studies are reviewed and discussed. Emphasis on sociological analysis, not on the implementation of solutions.

4540 Social and Religious Change (4) Critical review of historical and contemporary theories and methods employed in study of social change. Attention given to both macro and micro group change. (Same as Religious Studies 4540.) A

4560 Formal Organization (4) Analysis of bureaucracy, process, division of labor, delegation of authority, and formalized communication under a system of rationality.

4820 American Minority Groups (4) Minority groups and social structure in American society; analysis of intergroup relations with attention given to both past and present relationships of selected groups to broader society.

4930 Social Movements (4) Development, organization, and function of social movements; attention is given to the ideology, leadership and organization of political, religious and other types of social movements.

4940 Sociology of Religion (4) Interrelationship of society, culture, and religion. (Same as Religious Studies 4940.) A

4960 Tradition, Change and Modernity in Asia (4) (Same as Religious Studies 4960.)

5000 Thesis (1-15) E

5020 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

5010 Professional Seminar (1) Limited to sociology graduate teaching assistants or graduate assistants. May be repeated. Maximum 4 hrs. S/N only. W, Sp

5040 Methodological issues in Social Research (3)

5050 Seminar in Political Sociology (3) Political system from societal, organizational, and group perspectives.

5060-70 Special Social Investigation (3, 3) Directed readings and/or research projects. E

5200 Seminar in Collective Behavior and Social Movements (3)

5210 Social Theory (3) F

5230 Social Control (3)

5230 Seminar in Sociology of Medicine (3)

5251 Historical Demography (3) Family reconstitution, aggregate analysis, strategies for examining demographic data; analysis of general methodological principles to actual field research projects. May be repeated. S/N only. W, Sp

5310 Seminar in Methods of Sociological Research (3) Major methodological issues in sociology, scaling techniques; reliability, validity, sampling, and qualitative methodology.

5320-30 Social Statistics (3, 3) General survey of parametric and nonparametric procedures in analysis of sociological data; assumptions underlying procedures; advantages, disadvantages, and special applications. Must be taken in sequence. F; W

5420-30 Social Theory (3, 3) W; Sp

5520 Crime, Law, and Social Control (3)

5530 Seminar in Community (3)

5550 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in communities.

5560-70 Field Research in Deviance (3, 3)

5580 Sociology of Mental Disorders (3) Relation of changes in biological models and substantive theories of mental illness. Historical development of theoretical conceptualizations. Interdependence of theory and therapeutic techniques. Epidemiology of mental disorders. Review of major studies.

5590 Social Differentiation and Stratification (3) Various sources of differentiation in society; their relations to class structure and their relationship to class structure in society.

5610 Seminar in Occupations (3) Occupations and their relation to individual and society; technology, and occupations; use of rewards and occupations; social organization and occupations.

5620 Seminar in Occupations (3) Continuation of material in Sociology 5610; interface between occupations and settings in which they are performed.

5630 Seminar in Occupations (3) Research participation; directed projects on subjects developed in 5620. Prereq: 5610 or 5620.

5640 Social Structure and Personality (3) Social interaction and personality; genesis and functioning of self; cultural basis of personality. May be used for credit in psychology.

5670 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5720 Small Group Theory and Research (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to test selected theoretical problems. May be repeated.

5730 Seminar in Research Problems in Inter-group Relations (3) Research techniques and problems as encountered in race and intergroup relations are explored; actual field research projects are performed.

5810 Seminar in Race and Culture (3) Critical examination of theoretical and conceptual approaches in study of intergroup relations. A

5910 Urban and Regional Sociology (3)

5920 Seminar in Social Attitudes (3)

5940 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delinquency; research findings related to them, and their implications for formal strategies of control and rehabilitation.

5960 Demographic Techniques (3) Life, table, standard rates, and survey techniques of population analysis. A

5970 The Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Analysis of changes between urbanization, industrialization, and modernization.

6000 Doctoral Research and Dissertation (3-15) E

6040 Experimental Research (3)

6050 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychology 6050.)

6070 Field Research (3)


6090-100 Survey Design and Analysis (3, 3) Application of general methodological principles to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtrs.).

6130 Seminar in Mass Behavior and Related Topics (3)

6140 Advanced Readings in Sociological Theory (4) S/N only. E

6150 Advanced Readings in Sociological Methods (4) S/N only. E

6160 Advanced Social Research Investigation (4) E

6170 Cross-cultural Aspects of Human Fertility (3) Historical, topical, regional, and methodological approaches to human fertility and demographic problems. Consideration of relations obtained between socioeconomic and demographic change in various parts of world; fertility rates and national
power; controversies on control of vital rates of growth.

5100 Theory and Method of Human Ecology (3)
Theoretical perspective and research techniques of human ecology applied to selected research sites.

6190 Advanced Special Social Investigation (4) E

6240 Theory and Research in Human Migration (3)

6510 Advanced Issues in Criminological Theory (3)
Emphasis on problems related to theory construction and measurement.

6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding causal and procedural programs and procedures for social control. Prereq: 4130 and 5520.

6530 Sociology of Law (3) Analysis of social and cultural factors influencing emergence and maintenance of law as social institution and affecting relations between law and deviant behavior; appraisal of the theoretical and methodological issues encountered in studying law. A

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 forms organizational theories; bureaucracy; functions of theoretical models of organizations; major organizational variables; organizational authority patterns; communication in formal organizations. Prereq: 3810-20.

6620 Seminar in Formal Organization (3) Organizations, organizational change and effect of technology; social consequences of automation; unionization and organization; organizations and community interrelatedness. Prereq: Consent of instructor. Sp

6630 Seminar in Formal Organization (3) Comparative organizational analysis; case studies, selected readings; Personality and organization. Prereq: Consent of instructor.

6710 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in research and current position of theory.

6810 Advanced Studies in Social Psychology (3)
Social interaction and personality; genes and functioning of self; interplay of social structures and individual actions; theories of social psychology related to the above; problems and research are discussed. May be repeated. Prereq: 3130 or 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.

6950 Seminar in Population Theory (3) Malinows, Marx, optimum population, and selected variables. A

Spanish

See Romance Languages

Speech and Hearing

See Audiology and Speech Pathology

Speech and Theatre

MAJOR

Speech and Theatre

DEGREE

M.A.

Pittsburgh; P. L. Soper, (Emeritus) Ph.D.

Cornell; G. A. Voemans, Ph.D. Louisiana State.

Associate Professors:
N. C. Cook, M.A. Alabama; R. C. Field, M.A.

Miami (Ohio); J. W. Linder, Ph.D. Northwestern;

A. J. Harris, Ed.D. Tennessee; F. D. Julian, Ph.D.

Tennessee; L. W. Lander (Head), Ed.D. Tennessee; R. R. Mashburn, M.A. Tennessee.

Assistent Professors:
R. S. Ambarish, Ph.D. Ohio State; M. L. Ambrester, Ph.D. Ohio (Athens); J. F. Buckley, Ph.D. Northwestern; M. Custer, M.F.A.

Wisconsin; B. V. Daniels, Ph.D. Cornell; L. J. DeConti, M.F.A. Tulane.

MASTER OF ARTS DEGREE
CURRICULUM

The departmental requirement for the M.A. degree in Speech and Theatre is 45 quarter hours (inclusive of hours taken toward a minor). At least 22 hours of which must be earned in courses numbered 5000 or above. Only 9 hours of thesis credit (Speech and Theatre 5510) may be included in the 45-hour minimum for the degree. Speech and Theatre 5110 is required of all M.A. students. Area concentration requirements are as follows:

Speech Communication
(1) Enrollment in Speech 4999 during each quarter of full-time graduate study.
(2) 12 hours in rhetorical and communication theory.
(3) 9 hours in public and interpersonal communication.
(4) 3 hours (not inclusive of Speech and Theatre 5110 and Speech 54999) in methods and materials in theatre.

Theatre
(1) 15 hours in theatrical history and criticism.
(2) At least 9 hours (and no more than 12 hours) in performance and production courses may be included in the 45-hour minimum for the degree.
(3) No more than 6 hours in projects courses.

For detailed information, contact the Director of Graduate Studies, Department of Speech and Theatre.

Speech

3541 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211.

4222 Advanced Argumentation and Debate (4) Prereq: 2331 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.

4560 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public address in campaign for women's rights from the 1830s to present. F

4571 British Oratory (4) Historical and critical study of British public address. Sp, A

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. W

4811 Advanced Phonetics (4) Phonetic aspects of contemporary English language. Prereq: Consent of instructor. Sp, A

4911-21 History of American Public Address (4, 4)
4911-Colonial period to 1865. 4921-1666 to present. W, A; Sp, A

4999 Colloquium in Speech Communication (1) May be repeated. Maximum 4 hrs. E

5140 Communications Theory (3) Analysis of contemporary theories of human communication, emphasizing similarities and differences of communication processes in interpersonal, group, and mass communications systems. F

5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs. Sp

5220 Quantitative Projects in Speech Communications (3) May be repeated. Maximum 9 hrs. E

5340 Studies in Tennessee Oratory (3) May be repeated. Maximum 9 hrs.

5440 Organizational Communication (3) May be repeated. Maximum 9 hrs. F

5550-60-70 Studies in Persuasion (3, 3, 3) W

5750-60-70 Studies in Rhetoric (3, 3, 3) F

5911 Directing the Forensic Program (4) Philosophy and methods of directing cocurricular and extracurricular forensics in high schools and colleges; competitive and noncompetitive approaches to directing debate, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911) Sp

Speech and Theatre

4170-80-90 Film History and Theory (3, 3, 3) Analysis of cinematic and literary styles. 4170—Narration. 4180—Exposition and persuasion. 4190—Experimental forms; films and other media.

4640 Group Performances of Literature (4) Oral interpretative techniques of choral reading, readers theatre and chamber theatre. F, W

5000 Thesis (1-15) E

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

5110 Introduction to Graduate Research in Speech and Theatre (3) F

5120 Directed Reading and Research (3) May be repeated. Maximum 9 hrs. E

5160 Theory and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. May be repeated. Maximum 8 hrs. W, Sp

Theatre

3121-22 Advanced Acting (4, 4) Historical styles of acting. 3121—Renaissance. 3122—seventeenth and eighteenth centuries. Prereq: Consent of instructor.

3151 Theatre Practicum: Performance (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

3152 Theatre Practicum: Production (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

3153 Summer Repertory Productions (4) Supervised work on summer repertory productions. Available only to members of summer company by consent of instructor, Su

3214-15 Technical Theatre (4, 4) Special techniques in scenery and property construction; stage management; problems in basic technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be taken in sequence.

3221-22 Introduction to Scene Design (4, 4) 3221—Problems in stage design with reference to space and form, movement, scale, and style; rudiments of rendering and ground plan preparation. 3222—Play
Theatre.

3252-53-54 History of the Theatre (4, 4, 4) Drama in antiquity to the Renaissance. Available for credit only to theatre majors. Prerequisite: 2211-21.

3451-52 Play Directing (4, 4) Must be taken in sequence. Prerequisite: 3511 or consent of instructor.

3321-22 Introduction to Lighting Design (4, 4) Must be taken in sequence. Prerequisite: 2211-21, 3221-22.


5320 Studies In American Theatre History (3) May be repeated. Maximum 9 hrs. F; W

5310 Studies in European Theatre History (3) May be repeated. Maximum 9 hrs. E

5890 Studies in Theatrical Production (3) May be repeated. Maximum 9 hrs. Sp

5912 Play Production in Secondary Schools (4) Principles and methods for directing high school dramatic programs. (Same as Curriculum and Instruction 5912.) Su

5960-81-82 Design and Theatre Technical Seminar (6, 6, 6)

Speech Pathology

See Audiology and Speech Pathology

University Studies

University Studies deal with important contemporary topics which are sufficiently comprehensive to require the study and attention of students and faculty from more than one college. They are open to all qualified members of the university community.

4100 Energy Needs and Our Environment (3) Problems of present and projected energy resources and demands; economic, behavioral, legal, technical and environmental opportunities and constraints; regional impacts of energy production and consumption. Topical focus will change from quarter to quarter. May be repeated with consent of instructor. May not be taken for graduate credit by Ecology majors.

Zoology

Zoology

MAJOR

DEGREES

Zoology

MS., Ph.D.

Professors:

J. M. Abel (Head), Ph.D. Brown; R. M. Bagby, Ph.D. Illinois; D. L. Bunting, Ph.D. Oklahoma State; J. G. Carlson (Emeritus), Ph.D. Pennsylvania; A. J. Clark (Emeritus), Ph.D. Ohio; J. C. Daniel Jr., Ph.D. Colorado; D. A. Ehler, Ph.D. Minnesota; R. C. Fraser, Ph.D. Minnesota; B. F. Hochman, Ph.D. California (Berkeley); J. C. Howell, (Emeritus), Ph.D. Cornell; K. L. Jones, Ph.D. London (England); A. W. Jones, (Emeritus), Ph.D. Virginia; J. R. Kennedy, Ph.D. Iowa; J. N. Liles, Ph.D. Ohio State; L. E. Roth, Ph.D. Chicago; C. A. Shivers, Ph.D. Michigan State; J. T. Tanner, (Emeritus), Ph.D. Cornell; S. R. Tipton, (Emeritus), Ph.D. Duke; H. G. Weich, Ph.D. Florida; G. L. Whittson, Ph.D. Iowa.

Associate Professors:

K. D. Burnham, Ph.D. Iowa; A. C. Echternacht, Ph.D. Kansas; A. A. El-Banna, Ph.D. Illinois; J. T. Farnsworth, Ph.D. California (Davis); M. L. Pan, Ph.D. Pennsylvania; S. E. Riechert, Ph.D. Wisconsin; G. A. Vaughan, Ph.D. Duke; M. C. Whiteside, Ph.D. Indiana.

Assistant Professors:

T. C. Chen, Ph.D. Florida; L. D. Etkin, Ph.D. Indiana; N. Griswold, Ph.D. Rutgerts; M. A. Handel, Ph.D. Kansas State; G. F. McCracken, Ph.D. Cornell.

The Department of Zoology offers the Master of Science and Doctor of Philosophy degrees with concentrations in aquatic biology and ecology, cell biology and radiation biology, physiology, genetics, organismal and field biology, and reproduction and developmental biology. Requirements for admission: Applicants for graduate study must have a background no less extensive than that required of undergraduate majors in this department. This includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are: (1) general zoology or general biology, 12 quarter or 8 semester hours; (2) upper division zoology, 18 quarter or 12 semester hours; (3) chemistry, two years including 12 quarter or 8 semester hours of general inorganic; (4) mathematics, 9 quarter or 6 semester hours including differential and integral calculus; (5) physics, 12 quarter or 8 semester hours; (6) Graduate Record Examination scores (Verbal, Quantitative and Analytical) (500 or above) in Advanced General 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 Committee.

A course in biostatistics is required of all candidates for an advanced degree in Zoology.

All aspirants for advanced degrees in Zoology must exhibit competency in four (M.S.) or five (Ph.D.) of six areas of zoology as determined by a comprehensive examination. Students must take this examination during the fall quarter of the first year and may repeat the examination the following fall quarter if unsatisfactory scores are received. Competence must be exhibited within this two-year period for a student to continue in the program.

Preparation for thesis or dissertation: During the first year a written examination and a special research problem in each of two faculty members' laboratories will determine the student's preparation for thesis or dissertation study.

THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee; (2) the preliminary examination will be an oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a B in 9000 level language courses. This requirement for the first language must be fulfilled before the student can take the preliminary examination.

The student's faculty committee may require of the student any level of training or proficiency in a second foreign language but may not require that the student take the official language examination in the second language.

1Alumni Distinguished Service Professor.
lular level. Preparation and use of immunofluorescent reagents, macrophage migration inhibition, skin allograft reactions, diffusion chamber cultures, and antibody formation at cellular level. 4 hrs and 2 labs.

5760 General Vertebrate Neuroanatomy (3) (Same as Psychology 5760.)

5780 Radiation Physiology (4) Effects of different kinds of radiations on functions of cells, tissues, and organ systems of animals. Recommended prereq: 5610. (Same as Radiation Biology 5780.)

5790 Transport of Ions Across Epithelia (4) Operational principles and methods needed to study electrical and kinetic properties of epithelia and electrically excitable tissues. Quantitative methods of measuring ion fluxes and flux ratios. Prereq: Two upper-division physiology courses, graduate standing, or consent of instructor. Recommended prereq: Chemistry 3810.

5820 Methods of Taxonomy (4) Classification of animals; rules of nomenclature; problems in priority, preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W

5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp

5860 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.

5870 Insect Synecology (4) Ecology of insect communities.

6000 Doctoral Research and Dissertation (3-15) E

6110 Seminar in Cellular Biology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6140 Seminar in Immunobiology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6210 Seminar in Physiology (2) Prereq: Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) Prereq: 4310. May be repeated. Maximum 6 hrs. W

6350 Seminar in Developmental Biology (2) Internal regulation in differentiating cell. Prereq: 3050, 4050; Biochemistry 4110-20. W

6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

6610 Seminar in Genetics (2) Prereq: General genetics. May be repeated. Maximum 6 hrs. F

6650 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, 4660-70, Botany 3061, or consent of instructor. May be repeated. Maximum 6 hrs. F, W, Sp

6710 Seminar in Ecology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6910 Seminar in Radiation Biology (2) Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
MAJOR DEGREE
Nursing M.S.N.

The College of Nursing offers a five-quarter program of study leading to the Master of Science in Nursing degree. The general purpose of the program is to prepare at the graduate level nurses who are qualified to function as practitioners, clinicians, educators, and administrators in all segments of the health care delivery system.

Upon successful completion of the program, graduates will be able to:
1. Provide advanced high quality, comprehensive nursing care to individuals and groups in a variety of settings;
2. Collaborate with other health professionals in systematic implementation and evaluation of health care delivery to large groups in agency and community settings;
3. Utilize appropriate advanced teaching, administrative and clinical practice skills in the discharge of one’s professional responsibilities;
4. Utilize appropriate research findings in the implementation and evaluation of nursing care;
5. Participate in clinical research activities by means of data collection, tabulation, and analysis, and by generating research topics for referral to nurse researchers.

GENERAL REQUIREMENTS FOR ADMISSION
1. Meet requirements for admission to the Graduate School.
2. Hold a Bachelor’s degree in Nursing. If the Bachelor’s degree is not in Nursing, the applicant must demonstrate successful completion of the equivalent of an upper division major in Nursing.
3. If the number of qualified applicants exceeds the number that can be accommodated, preference will be given to applicants:
   a. whose undergraduate GPA is 3.0 or higher;
   b. who have had at least two years of full-time clinical practice experience following completion of a baccalaureate nursing program;
   c. who are Tennessee residents;
   d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program;
   e. who are currently employed as nurse educators in programs preparing registered nurses; or
   f. who are currently employed as directors of nursing service.
4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.

DEGREE REQUIREMENTS
1. Students must complete 60 quarter hours of graduate level course work with a cumulative GPA of 3.0 or better.
2. The 60 credit hours must include the following components:
   a. Core requirement
   b. Clinical concentration option
   c. Functional concentration option
   d. Electives

   Total 60 hrs
   Core requirement 17 hrs
   Clinical concentration option 26-30 hrs
   Functional concentration option 11 hrs
   Electives 5-9 hrs

   Total 60 hrs

3. A Master’s thesis is not required, but those students who wish to complete a thesis as a part of their program may substitute the thesis for the 9 elective hours.
4. Those students who do not choose the thesis option must successfully complete a comprehensive final examination.
5. Students may choose either primary care nursing, secondary care nursing or community mental health nursing as a clinical concentration option. Students selecting the primary care nursing option must complete the following courses: 4770, 5050, 5240, 5260, 5500 and 5560. Students selecting the secondary care nursing option must complete the following courses: 5120-30 (or 5140-50), 5310, 5330. Students selecting the community health nursing option must complete the following courses: 5410-20-30-40, 5470, 5510, 5530.
6. The core requirement which must be completed by all students regardless of clinical option includes 5010, 5020, 5030, 5210 and a graduate level statistics course which must be approved in advance by the student’s faculty advisor.
7. Students may select a functional concentration option in teaching, management or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5730. Students selecting the management option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the advanced clinical practice functional option must complete 5560 and 5560 if their clinical option is primary care, 5320 and 5340 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. All courses taken in other colleges must be approved in advance by the student’s faculty advisor.

Faculty
Professor:
S. E. Hart (Dean), Ph.D. New York.
Associate Professors:
M. E. Groer, Ph.D. Illinois; K. J. Kant, Ph.D. Illinois; J. Mailan, Ph.D. Purdue; B. M. Reid, M.S.N. Columbia.
Assistant Professors:

Courses
4240 Nursing in Acute Care Settings (5) Theory and clinical practice related to care of hospitalized children and adults experiencing acute illness episodes. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses. 3 hrs and 2 labs. Su
4260 Community Mental Health Nursing (5) Theory and clinical practice related to care of clients whose
primary actual or potential health problem is psychosocial or developmental; strong family and community orientation with emphasis on mental health issues. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All 2000 and 3000 level nursing courses and 4200. Coreq: 4210. 3 hrs and 2 labs. Sp

4280 Nursing the Child Bearing Family (5) Theory and clinical practice related to care of clients and their families in varying stages of child bearing and child rearing, normal and abnormal states. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses. 3 hrs and 2 labs. Sp

4330 Nursing in the Specialties (2-4) Application of principles from behavioral, physical, social and nursing sciences to solution of nursing problems. Exploration of nursing intervention needed to maintain or restore homeostasis in clients experiencing selected physiological or behavioral deviations. Specific topics to be determined by faculty and students. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 12 hrs.

4350 Oncology Nursing (3) In-depth exploration of the cancer problem, medical and nursing intervention. Relates cellular kinetics to theories of carcinogenesis and metastasis, and examines treat- ment modalities and nursing intervention employed in treatment. Prereq or coreq: 4200. Coreq: Interdisciplinary approach analysed. Prereq: 4230. R.N. status, or consent of instructor.

4770 Comprehensive Health Assessment (6) Principles and techniques providing health screen- ing of children and adults, including health history, inter- view and physical examination. Prereq: All 3000-level nursing courses or equivalent or consent of instructor. 4 hrs and 2 labs. F, Sp

4810 Management of Patient Care (3) Theories of leadership, management and supervision as applied to professional nursing practice. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: 4240-60-80.

4820 Clinical Nursing Practicum and Seminar (6) Intensive clinical laboratory with opportunity to apply nursing and nursing related theories in a variety of health care settings. Weekly seminars with clinical practice. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: 4240-60-80. Coreq: 4810. Sp

5000 Thesis (1-15) E

5022 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during which such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5100 Applied and Pathophysiology (3) Advanced physiological theories and principles related to normal and abnormal body function with particular emphasis on those processes which, when altered, are most commonly encountered in acute and chronic disease states. Prereq: 3210-20 or 4010 or consent of instructor. 3 hrs and 2 labs. Sp

5200 Current Health Issues (2) Weekly seminar dealing with current and pending legislative, political, and community issues, concerns, and actions that affect health care. Also indirect implications for nursing and health care. E

5300 Behavioral Dynamics (3) Interviewing and communication theories utilized in nurse-client interaction. Prevention, intervention, assessment and treatment of anxiety, depression, psychosomatic and crisis states. Prereq: 16 hrs in undergraduate or graduate behavioral sciences. E

5500 Applied Pharmacology (4) Advanced pharmacological concepts applied to clinical situations; in-depth exploration of indications, contra-indications; side effects; toxic effects; and interactions. Prereq: Consent of instructor. May be repeated. Coreq: 4200. 4 hrs and 2 labs. Sp

5630 Teaching Strategies and Practicum (5) Preparation of mental health nurses to function as a nurse practitioner. Prereq: 5050, 5240, 5310. Coreq: 5250. 5 hrs and 2 labs. Sp

5700 Readings in Applied Physiology (3) Carefully planned library study of selected topics in physiolog- y and pathophysiology related to various body systems. Prereq: 5010. E

5210 Nursing Research Methods (4) Utilization of research process to identify and solve common nursing problems; data collection and analysis; use of the literature; presentation and publication of findings. Prereq: Graduate level course in behavioral or biomedical statistics. W, Sp

5240 Management of Common Health Problems (5) Indicators for treatment and referral, use of protocols and treatment plans; pharmaceutical agents in common use; intervention in emergencies. Prereq: 5010, 4770. 3 hrs and 2 labs. W

5250 Chronic Health Problems (4) Indentification and in-depth exploration of health problems of long-term or lifelong nature common to people in various age groups over life continuum; nursing and health care management of individuals and groups who must deal with one or more chronic health problems throughout most or all of their lives. Prereq: 5010, 4770. 4 hrs and 2 labs. W

5310 Secondary Care Nursing Field Work I (9) Advanced clinical practice in acute care hospital set- tings with opportunities to apply newly acquired nursing knowledge to more complex clinical nurs- ing situations. Prereq: 5120-30 or 5140-50. Su

5320 Secondary Care Nursing Field Work II (9) Continuation of 5310 with emphasis on further acquisi- tion and refinement of nursing skills needed to pro- vide high quality nursing care to acutely ill patients. Prereq: 5310. Su

5330 Secondary Care Nursing Seminar I (2) Weekly on-campus seminar taken concurrently with 5310; topics focus on discussion of nursing problems commonly encountered in acute care settings. Su

5340 Secondary Care Nursing Seminar II (2) Con- tinuation of 5330 to be taken concurrently with 5320. F

5410 Principles of Community Mental Health (3) Epidemiology, services, community mental health centers, F

5420 Principles of Community Mental Health II (3) Continuation of 5410 with emphasis on recognized and developing approaches to mental health pro- blems in community settings. F

5430 The Adult and Mental Health (3) Coping and adjustment problems commonly experienced from post-adolescence through middle adulthood; nurs- ing approaches to alleviation of mental health problems of both institutionalized and non-institution- alized adults. 2 hrs and 1 lab. W

5440 The Child and Mental Health (3) Normal and abnormal behavioral and psychosocial develop- ment from infancy through adolescence; emphasis on primary prevention activities. Treatment systems and modalities in clinical settings. Prereq: 5430. 2 hrs and 1 lab. Sp

5470 Advanced Psychiatric Nursing Skills (3) Group and family process and therapy in primary and secondary levels of mental health. Continued exploration, analysis and application of other therapeutic interventions. Prereq: 5430. 2 hrs and 1 lab. Sp

5510 Community Mental Health Nursing Field Work I (6) Clinical practice in a community setting pro- viding opportunities to apply mental health nursing knowledge in planned interactions with individuals and groups at primary, secondary and/or tertiary care levels. Community and mental health systems assessment. Prereq: 5010, 4770. 6 hrs and 1 lab. F

5520 Community Mental Health Nursing Field Work II (6) Clinical practice for graduate student choos- ing functional concentration of advanced clinical practice. Objectives identified by student to meet specific learning and practice needs. Prereq: 5510 and 5530. F

5530 Community Mental Health Nursing Seminar I (3) On-campus seminar taken concurrently with 5510; common nursing and community problems encountered by community mental health nursing field students. Su

5540 Community Mental Health Nursing Seminar II (2) Taken concurrently with 5520; a concentration of 5530. F

5550 Nurse Practitioner Fieldwork I (6) Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowl- edge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5050, 5240, 5520. Su

5560 Nurse Practitioner Fieldwork II (6) Continua- tion of 5550 with further emphasis on acquisition of nurse practitioner skills coupled with ability to func- tion autonomously in primary health care. Prereq: 5050, 5240, 5520. Su

5600 Teaching Strategies and Practice and (Practicum) (5) Analysis and application of curricular and teaching modalities; field placement with supervised opportu- nities to provide both classroom and clinical in- struction to undergraduate nursing students. Prereq: 6 hrs approved education courses or consent of instructor. 2 hrs and 3 labs. F, Sp

5590 Nurse Practitioner Seminar I (2) Weekly on- campus seminar taken concurrently with 5550; topics focus on common nursing and health problems encountered by nurse practitioner field students and on role of nurse practitioner in health care delivery. Su

5660 Nurse Practitioner Seminar II (2) Continua- tion of 5590 taken concurrently with 5550. F

5730 Management Strategies and Practice (5) Analysis and application of managerial and super- visory theories and strategies; field placement in nursing service facility with supervised practice in nursing service administration. Prereq: 6 hrs ap- proved management courses or consent of instructor. 2 hrs and 3 labs. F, Sp

5770 Special Topics (3) In-depth study of selected nursing topics, problems, or issues not covered in other courses. Prereq: Consent of instructor. Maybe repeated. Maximum 6 hrs.
The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, located within the Biology Division of Oak Ridge National Laboratory, offers programs leading to the Master of Science and Doctor of Philosophy degrees. The National Laboratory, one of three installations operated at Oak Ridge by Union Carbide Corporation for the Department of Energy, is a well-known center of basic research. The school utilizes the staff and facilities of this laboratory, and thus brings directly into the main stream of full-time graduate study in the life sciences the talent and experience of that staff, as well as the most advanced research methods and technology.

The program of study, which incorporates a high faculty-to-student ratio, is based on intensive graduate courses supplemented by tutorial instruction, participation in a wide variety of seminars, and a heavy emphasis on communication skills, research training and independent study. The program encourages students to pursue graduate studies to the limits of their abilities. The School is not departmentalized, and, apart from certain basic requirements, each student’s curriculum is planned to meet individual needs, with the aim of giving: (1) strength in the basic sciences; (2) perception of the biomedical sciences as a whole; and (3) experience and training in a chosen specialty.

The research areas available for Master’s thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, and cellular, developmental and mammalian biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, and problems of aging.

ADMISSION REQUIREMENTS

A Bachelor’s degree or its equivalent is required. Students with M.S., D.V.M., or M.D. degrees are also encouraged to apply. Completed applications, Graduate Record Examination scores and letters of reference should be sent to the address below. The student will need previous training in biology, calculus, physics, and organic and physical chemistry. However, a course in physical chemistry is offered by the School in order to meet this requirement. It is recommended that deficiencies in meeting entrance requirements should be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to: Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM

Requirements for the Ph.D. degree are:

1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology (5180-90); Mammalian Physiology (5200); Molecular Genetics (5170); and Genetics (5160).

2. Three quarters of Biomedical Sciences Laboratory (5310-20-30-40).

3. Participation in Biomedical Sciences Seminar (5350-60-70) for one year.

4. Participation in at least one of the seminars during each quarter of residence after the first year is strongly recommended.

5. A Master’s Committee of three approved faculty members upon admission to candidacy.

6. Fifty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of credit for course 5000).

7. For admission to candidacy: Completion of any required prerequisite courses and one quarter of graduate course work with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.

8. A thesis reporting results of original and significant scientific research.


SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and as space is available.

Requirements for the M.S. degree are:

1. Graduate credit or a proficiency in the following core courses: Biochemistry (5110-20); Cell Biology I (5180); Cell Biology II (5190); plus any three of the following four courses: Biophysics (5140); Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives.

2. Forty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of credit for course 5000).

3. For admission to candidacy: Completion of any required prerequisite courses and one quarter of graduate course work with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.

4. A Master’s Committee of three approved faculty members upon admission to candidacy.

5. A thesis reporting results of original and significant scientific research.

6. A final oral (oral and written) examination as determined by the student’s committee.

Full-Time Faculty

Professors:

D. Billen, Ph.D. Tennessee; D. E. Olins, Ph.D. Rockefeller.

Associate Professor:

F. H. Gaertner, Ph.D. Purdue.


5300-50-30-40 Biomedical Sciences Laboratory (3, 3) Techniques and methods used in modern biochemical laboratories. Students spend a quarter in each of three or four laboratories, each of which deals with a different area of modern biological research. Required of all first-year students.

5350-50 Biomedical Sciences Seminar (1, 1) Critical analysis of current journal publications in selected areas of modern biological research. Written evaluation of papers and weekly oral presentations by each student. Required of all first-year students.

5370 Biomedical Sciences Seminar (1) Basic principles of scientific writing. Research articles, grant and thesis proposals, abstracts, reviews, articles for publication. Prereq: 5350-50. Coreq: M.S. in Biomedical Sciences.

5380-90 Graduate Research Participation (3, 6, 9) Special advanced research project covering an area not related to dissertation research. Topics chosen with consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.


5430-60-90 Graduate Research Participation (3, 6, 9) Special advanced research project covering an area not related to dissertation research. Topics chosen with consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.


5450 Biochemistry Seminar (2) May be repeated. Maximum 12 hrs. S/NC only.

6110 Seminar in Plant Physiology (1) May be repeated. Maximum 12 hrs. S/NC only.

6120 Seminar in Cellular and Developmental Biology (1) May be repeated. Maximum 12 hrs. S/NC only.

6130 Seminar in Genetics (1) May be repeated. Maximum 12 hrs. S/NC only.

6140 Seminar in Mammalian Research (1) May be repeated. Maximum 12 hrs. S/NC only.

6150 Seminar in Biochemistry (1) May be repeated. Maximum 12 hrs. S/NC only.

6160 Seminar in Biophysics (1) May be repeated. Maximum 12 hrs. S/NC only.

6170 Seminar in Biochemistry (2) May be repeated. Maximum 24 hrs. S/NC only.

6180 Advanced Seminar in Biomedical Sciences (1-3) Presentation, evaluation and discussion of current research in various areas of biomedical sciences, including cell biology, genetics, biochemistry, and biophysics. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6190 Seminar in Animal Virology (1) Discussion of experimental data and in-depth surveys of active research problems in virology through use of literature. Prereq: Microbiology 4521 or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.


6210 Protein Chemistry and Enzyme Mechanisms (3) Theoretical and practical aspects of protein chemistry. Prereq: Consent of instructor. May be repeated. Maximum 24 hrs. S/NC only.
substrates, covalent catalysis, general acid-base catalysis, and strain and distortion of substrates. Prereq: 5110-20.

6220 Enzyme Regulation and Kinetics (3) Kinetics of catalysis; inhibition by product, substrate and dead-end inhibitors; stimulation and inhibition of allosteric enzymes, types of feedback regulation; role of subunits in enzyme regulation; multifunctional enzymes. Prereq: 5110-20.

6240 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes, enzymic expression, and nervous tissue. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Prereq: 5110-20.

6270 Viral Carcinogenesis (3) History of viral oncology and descriptive catalog of tumor viruses. Biology of normal and transformed cells. DNA tumor viruses; replication cycle; transformation; genetics; natural history. RNA tumor viruses; endogenous and exogenous states; genetics; induction, transformation; natural history.


6290 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymology, metabolism; membranes; DNA repair; regulation; strategies in chemotherapy.

6300 Mutagenesis (3) Basic mechanisms in chemical and radiation mutagenesis and dosimetry in various systems including bacteria, fungi, Drosophila, and mice.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Current and future research developments. Topics listed under Special Topics Courses, can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.
Ann E. Prentice, Director

MAJOR
Library Science

DEGREE
M.S.L.S.

The Graduate School of Library and Information Science provides a library education program leading to the preparation of librarians for work in all types of libraries. The programs of study of this School include the graduate curriculum leading to the degree of Master of Science in Library Science.

MASTER OF SCIENCE
IN LIBRARY SCIENCE

The goal of the program is to prepare graduates to function effectively in libraries and information centers. The program is designed to:

1. Enable students to examine critically the role and function of librarians and information centers in our society, and to define and redefine that role as the needs of society demand;
2. Enable students to understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Enable students to understand and apply the principles of management to the library and information center;
4. Enable students to assume individual and collective responsibility for the well-being and development of their profession and of professional service;
5. Enable students to make informed assessments and decisions regarding various career opportunities in libraries and information centers.

PROGRAMS OF INSTRUCTION

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 21 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis program is available, with 9 hours allowed for thesis credit. At least 36 hours must be taken in the Graduate School of Library and Information Science, allowing up to 15 hours outside the School. Upon completion of the program, all students are subject to an examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination. Programs are designed for persons interested in school libraries, public libraries, academic libraries, special libraries and information centers as well as a variety of library and information related activities.

ADMISSION REQUIREMENTS

The minimum grade point average for admission to the Graduate School is 2.5. Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the aptitude test of the Graduate Record Examination. The test should be taken at least one quarter in advance of application for admission to the Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language.

APPLICATION PROCEDURE

Admission to the programs in the Graduate School of Library and Information Science should be made in advance of the quarter for which admission is requested. Applicants should submit the "Application for Admission" form (printed as the first page of the Graduate School Catalog) and should request the registrars of all colleges and universities attended to send two official transcripts to the Graduate School. In addition, each applicant should make arrangements to take the GRE and TOEFL exams, if applicable. A personal data sheet and three recommendations (obtained from the Graduate School of Library and Information Science) should be returned to the Director of the School.

FINANCIAL ASSISTANCE

OPPORTUNITIES

Employment with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus extend the period required for the degree up to two years.

Similar opportunities exist with some other libraries in the Knoxville area.

A limited number of graduate assistantships are available through the School for the degree. Assistantships of this type carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in the School.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

Faculty

Professors:
E. E. Mauldin, M.S.L.S. Illinois; G. R. Purcell, Ph.D. Case Western Reserve.

Associate Professors:

Assistant Professors:
J. M. Pemberton, Ph.D. Tennessee; G. M. Sinkankas, Ph.D. Pittsburgh.

Courses

4140 Libraries and Librarianship (3) Librarianship as an occupation: its organization, responsibilities, problems and prospects.

4150 School Library Administration (3) Objectives, functions, and place of school library; relationship to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.)

4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections.

4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries.

4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Vocational-Technical Education 4750.)

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
5110-20-30 Problems in Library Science (3, 3, 3) Repeated with consent of instructor. May be repeated. Maximum 6 hrs.

5200 Subject Reference and Bibliography (3) General patterns of bibliographical organization and basic information sources in subject fields including non-English materials; experiences in bibliographic methods and search techniques. Prereq: 4330.

5210 Sources and Services for the Social Sciences (3) English and non-English literature and bibliographical sources in education, economics, political science, history, anthropology, psychology, and sociology; organization of collections for optimum use. Prereq: 5200.

5220 Sources and Services for the Natural Sciences (3) English and non-English literature and bibliographical sources in mathematics, physics, astronomy, chemistry, geology, biology and medicine; organization of collections for optimum use. Prereq: 5200.

5230 Sources and Services for the Humanities (3) English and non-English literature and bibliographical sources in literature and language, fine arts, music, philosophy and religion; organization of collections for optimum use. Prereq: 5200.

5240 Organization of Library Collections II (3) Construction and maintenance of library catalogs as retrieval instrument; indexing and subject analysis; theory, comparative classification with emphasis on Library of Congress system, and problems in classification. Prereq: 4270.


5260 Government Publications II (3) Acquisition, organization and utilization of publications of foreign governments and international organizations such as United Nations, UNESCO, and others.

5270 Legal Bibliography (3) Introduction to literature of Anglo-American jurisprudence. Use of reports, statutes, administrative regulations and decisions, treatises, periodicals, and indexes as bibliographic tools.

5300 Library Management (3) Management and organization concepts applicable to libraries and librarians.

5310 Multitype Systems and Networks (3) Organization, structure, governance, planning, evaluation, and services in state, regional, national, and international networking of information.

5330 Academic Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group.

5350 School Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group. Prereq: 4150 or consent of instructor.

5360 Special Libraries and Information Centers (3) Development and present status, scope and objectives, administration and organizational problems, acquisition, organization, and use of information.

5370 The Library in the Community (3) Public library as social agency; role in education and communication systems of community.

5380 Seminar in Library and Information Science (3) Advanced study of varying topics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5400 Library Facilities (3) Problems inherent in planning and construction of library quarters. Inter-relationship of staff, materials, and user space requirements.


5510 Multimedia Resources of Libraries (3) Selection, acquisition, processing, storing, and servicing nonbook materials, with special attention to films, recordings, microforms, photo-copying.

5520 History of Books and Printing (3) Development of alphabet and writing; early writing materials; book in manuscript; history and technique of printing; book illustration and binding; standards of modern fine printing.

5530 Contemporary Publishing (3) Creation, production, marketing, and distribution of materials acquired by libraries, with special attention to various types of publishers.

5540 Special Collections—Archives and Rare Books (3) Problems involved in acquisition, organization, housing, preservation and utilization of rare books and archival materials.

5600 Reading Guidance for Children and Young People (3) Organization to meet needs, interests, abilities of different age and socioeconomic groups. Prereq: 5640 or consent of instructor.

5610 Mass Communications and the Library (3) Mass media of communication in terms of their relation to modern library service, considered as forces that influence what people read, see, and hear.

5620 Traditional Literature and Oral Narration (3) Fundamental principles of art storytelling; techniques of adaptation and presentation for various age groups; instruction and practice in oral techniques.

5630 Critical History of Children's Literature I (3) Development of literature for children noting influence of changing social and cultural factors; attention to emerging genres through primary sources. Fifteenth century to 1920.

5640 Critical History of Children's Literature II (3) Development of literature for children noting influence of changing social and cultural factors; attention to emerging genres through primary sources. 1920 to present.

5691 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 5691.)

5700 Automation of Library Processes (3) Analysis of application of data processing methods to basic library operations such as bibliographic control, technical processes, circulation control, and management functions.

5710 Introduction to Information Science (3) Content, method of information science; application of research findings to general library practice.

5720 Information Systems Analysis and Design (3) Elements in design and operation of information retrieval systems, including acquisition, indexing vocabularies, information representation, file organization, search procedures, and system evaluation.

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing performance of systems to arrive at generalizations with respect to theory, design, and operation of information retrieval systems.

5999 Practicum (6 or 9 or 12) Opportunity to translate library theory into practice under guidance of qualified librarians. Prereq: Completion of 21-hr core curriculum plus approval of director.
Graduate School of Planning

J. A. Spencer, Director

The Graduate School of Planning offers a two-year graduate course leading to a degree of Master of Science in Planning with concentrations in land use, transportation, environmental, regional, administrative, health, and historic preservation planning.

The purpose of study is the education of professional planners, competent to handle positions of increasing technical and administrative responsibility. Graduates are candidates for professional service in regional, city, county, and metropolitan area planning agencies; in local, state, and federal agencies concerned with urban problems; and in private consulting practices.

The curriculum is organized on a basis of 62 credit hours, and provides the student with core courses in planning theory, methods and techniques, as also takes advantage of offerings at The University of Tennessee in related fields such as government, economics, geography, civil engineering, and sociology.

The course of study ordinarily requires two years with an optional work internship during the summer between the two years. Planning courses as well as related courses will be offered during the summer period. This is to serve the needs of those planners now in the field who wish to acquire their professional degree but who can spare only the minimum amount of time from their jobs because of financial or family considerations.

Entering students follow a program of courses which provides education in the basic elements of planning. These include studies in theory, history, analytical methods, and legislation, as also related courses in government, geography, sociology, and economics. Students are permitted to pursue particular interests through the choice of electives approved by the Graduate School of Planning. Practice in research and analysis on a particular planning problem or topic is obtained through the preparation of a thesis or major study option.

Core planning courses are taught by the faculty of the Graduate School of Planning.

The following courses are the required core curriculum for the M.S.P. degree:

- 5040, 5045, 5100, 5110, 5130, 5180, 5230, 5270, 5290, 5340, 5435, 5440, 5465, 5500, Sociology 5320, or Statistics 5211. Waivers can be made by the faculty where competence is demonstrated.

Each student will be required to 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.

Students in the Graduate School of Planning are given a comprehensive written examination after approximately four quarters of course work. In addition to testing the knowledge of the student, the information thus obtained is taken into account in advising students concerning the study program they should undertake during the balance of their academic program to remove any indicated deficiencies.

Each student will be encouraged, but not required, to complete a work internship equivalent to at least two and one-half months of full-time work in a planning agency at approximately the mid-point in course work.

Faculty

Professors:

- K. V. Kenny, Ph.D. North Carolina;
- J. M. Prochaska, M.U.P. Michigan State;
- W. L. Shouse, M.C.P. Harvard.

Associate Professors:

- G. E. Bowen, M.A. George Washington; 
- J. A. Spencer, M.C.P. Ohio State.

Assistant Professors:


Courses

- 4100 Survey of Planning (3): History of city development and of planning with special attention to the U.S. experience in urban and other levels of planning. State of the art, the process, the comprehen-
5000 Thesis (1-15) E

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

5005 The Planning Process (3) Identification and examination of generic aspects of planning process and planning techniques applied in variety of settings. Not for credit for M.S.P. degree. F, Su

5040 Communications for Planners I (1) Introduction to basic communications, interpersonal and oral communications, graphic presentations, audiovisual equipment. F, Su

5045 Communications for Planners II (1) Graphic communications in planning. Maps and mapping, computer graphics, models and presentation graphics. Prereq: 5040. W

5050 Communication for Planners III (1) Audiovisual equipment, programmed communications, and photography used in planning. Prereq: 5045. Sp

5100 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner; planning function in public decision-making. Prereq: 5110. W

5110 Introduction to Planning (3) History of planning, familiarization with operations of contemporary planning, concept of systems, current trends and issues, Relationship between planning and society in which it occurs. Designed for GEP students. F, Su

5130 Planning Research Methods I (2) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making. (Same as Water Resources Development 5130.) F, Su

5135 Planning Research Methods II (3) Application of rigorous investigation techniques in solving planning problems, including statistical analysis and mathematical models. Urban and regional information systems as resource and tool in problem identification and solution. Prereq: 5130. W, Sp

5145 Library Research for Planning (1) Survey of publications of interest to planners, including information and research techniques. Use of facilities and collections of UTK library. F, W

5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Water Resources Development 5160.)

5170 Planning for Historic Preservation (3) Planning for preservation, restoration and conservation of historic buildings, areas and sites as related to local government role in preservation, designation of sites, legislative needs, financing and administrative organizations. F

5180 Planning Analysis and Forecasting (3) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, and economic base studies with emphasis on forecasting techniques. Prereq: 5130. W

5230 Urban and Site Design (3) Principles of design of residential subdivisions and some components of physical community, as shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience. E

5235 Urban and Site Design II (3-6) Prereq: 5230.

5270 Planning and Transportation (3) (Same as Civil Engineering 5270.) W

5280 Planning Methods (5) Tools and techniques for evaluation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5180. Sp

5300 Regional Planning (3) Making planning processes operate in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by states, single-purpose agency planning, and TVA. Prereq: 5100.

5310 State Planning (3) Evolution of planning function in state government, with emphasis on institutional environment in which planning occurs. Context and scope of state planning, and relationships with other branches and levels of government. Prereq: 5100.

5340 Implementation (3) Policy formulation, information systems, taxation, capital improvement programming, and other aspects of plan implementation. Programming public actions to affect development. Prereq: 5440. Su, F

5360 New Towns (3) Historical development of planned new towns and implications for national urbanization policy in United States. Plans by which new towns are created, from establishment of objectives to administration of development process and provision of public services, organizational alternatives for new town planning, development and management in context of past experience and future objectives. Prereq: 5110 and consent of instructor.

5380 Housing (3) Nature and demand for housing in U.S. and abroad with emphasis on U.S. experience. Private market processes and public influence. Problems of change in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing. Coreq: 5110 or consent of instructor.

5390 Futures (3) Alternative futures and their implications for future living patterns and community planning. Techniques of futures research.

5410-20-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. May be repeated. Prereq: Consent of instructor. E

5435 Planning and Government (3) Governmental context within which planning occurs. Policy making as public process. Planning structures, powers, and policies. F

5440 Planning and Land Use Controls (4) Legal basis for planning and guiding community development, Exercise of police power and property domain. Development and administration of zoning, subdivision controls, and related devices. Prereq: 5435. Sp

5455 Urban Revitalization (3) Goals, principles and strategies for restoring and revitalizing cities. Review and analysis of historic, current, and proposed public and private programs aimed at urban revitalization. Physical building and restoration activities as related to financial and administrative requirements. Relationship between construction oriented activities and economic and social development programs is emphasized. Prereq: 5110 or consent of instructor.

5460 Planning Administration (2) Planning agency management, program development, and agency finance. Prereq: 5435.

5465 Planning and Property Development (3) Process of urban physical growth and change with emphasis on functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 5440.

5500 Synthesis (9) Problem-oriented experience to integrate knowledge from previous courses. Interrelationships stressed; student required to use judgment in evaluation and creation of plans and policies addressed to real world situations. Extensive laboratory experience. Prereq: Required planning courses or consent of faculty. F, W

5670 Social Planning (3) Theory, philosophy and implications of programs for planned social change. Consideration of major social planning issues in diverse fields of service; aging, corrections, education, health, social services. Prereq: Consent of instructor. (Same as Social Work 5670.)
The University of Tennessee School of Social Work is a fully accredited two-year graduate professional school, with a program (thesis or non-thesis option) leading to the degree of Master of Science in Social Work. The full two-year curriculum is offered in all three branch locations.

GRADUATE PROFESSIONAL EDUCATION

The School of Social Work has as its primary objective the education and training of persons for leadership in the social welfare profession and the social work practice community. Leadership roles include positions in social welfare administration, social planning and policy development, and positions as treatment team leaders, supervisors, consultants, and expert practitioners.

Central to professional leadership are a commitment to the values and goals of the profession and a developed capacity for independent, analytical thought and preparation from which to operate in the future as practitioners and administrators.

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 9 hours of elective credit through completion of a Master's thesis.

**The Core Curriculum**

The core curriculum is offered during the first two quarters of the first year and is required of all students. It is a 30-quarter-hour sequence of five basic courses. As the initial phase of the School's educational program, the core curriculum contributes to the process of socialization and professional identification, and presents students with a comprehensive and broad knowledge base from which to operate in the future as practitioners and administrators.

**AREAS OF SPECIALIZATION**

Social Work Treatment

Social work treatment deals with those individual, family, and group methods utilized...
to enhance the social functioning of individuals and effectively ameliorate problems of social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methodology based on group individual, family, and group methods applicable in the treatment of diverse client problems.

Social Welfare Administration and Planning

Social welfare administration and planning deals with the design, implementation, and continued operation of effective programs for client service. Specifically, the 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.

Field Practice

Field practice is a critical component of the student's first- and second-year program. Because the School of Social Work cooperates with a wide range of social agencies and human service programs in the principal cities in Tennessee and areas immediately adjacent to the State, the School is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agency and the field instructor to insure that the student has a quality field practice experience which meets the objectives of the core curriculum and the specialization.

The first-year curriculum is on a concurrent class and field plan, with students engaged in classroom study two or three days per week and in field practice the remainder of the week. First-year agency placements are selected to provide the student with practice experiences related to the core curriculum content and beginning specialization. Within the placement, each student's experiences are planned and designed according to the educational needs.

In the second year, students are engaged full time in classroom courses during the fall quarter. The winter and spring quarter plan consists of a block field placement of four days per week and at least one concurrent classroom course each quarter. Second-year placements are selected according to the student's area of specialization, individual career and educational needs. The student actively participates with the field practice coordinator and the specialization committee in selecting the second-year placement. The second-year field practice experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of full practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

DEGREE REQUIREMENTS

1. Satisfactory completion of the curriculum.
2. All courses taken as part of the degree program, whether taken within the School of Social Work or outside, must be acceptable for graduate credit, relevant to social work and to the student's career objectives, and have the approval of the student's faculty advisor.
3. Achievement of a B average on all work presented for the Master's degree.
4. Completion of each required course at a satisfactory level (a grade of C or above). Graduated courses may not be repeated to raise the grade.
5. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
6. Students who elect a non-thesis option must pass a written comprehensive examination.
7. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.
8. The minimum number of credit hours required for a degree shall be 79 hours including a maximum of 36 SINC hours.
9. Performance at a satisfactory level in field practicum, which is designed to teach professional practice skills.

ADMISSION REQUIREMENTS

Admission to the professional curriculum is based on the following requirements:
1. A bachelor's degree from an accredited college or university with some preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in the social sciences, humanities, physical sciences, and other liberal arts subjects. 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.
4. Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed not later than March 1 for the year in which admission is desired.

THE ADMISSIONS PROCESS

Individuals who wish to be considered for admission should obtain the required application materials from the Office of Admissions, UT School of Social Work, 2014 Lake Avenue, Knoxville, TN 37916, telephone (615) 974-3175. Beginning of students are admitted only in the fall quarter. The Admissions Office begins processing applications after October 1 for the following fall quarter. Applications for first-year admission should be filed as early as possible. A minimum of six weeks should be allowed for consideration of the application.

Students intending to apply for financial aid are encouraged to apply for admission to the School as early as possible. By doing so, students should be able to meet financial aid application deadlines which are April 1 for the following fall quarter.

To apply for admission, applicants should forward the completed Graduate School Application and payment of a nonrefundable $10 application fee to the Graduate School Office, The University of Tennessee, Knoxville. Two official transcripts of all undergraduate, graduate, and extension work (except work taken at The University of Tennessee, Knoxville) should be sent to the Graduate School Office immediately after filing the Graduate School Application. The completed University of Tennessee School of Social Work Application for Admission on the Regular Basis should be returned to the Admissions Office of the School of Social Work.

If a personal interview is required by the School, the applicant will be contacted by a representative of the School and arrangements will be made concerning a time and place. Applicants who wish to may also request a personal interview with a faculty member.

ACCELERATED PROGRAM

The University of Tennessee School of Social Work has a special accelerated program which enables eligible candidates to complete the M.S.S.W. degree in four quarters. This Accelerated Program is approved by the Council on Social Work Education.

Students who qualify for the Accelerated Program must:
1. Have maintained a 3.0 or above grade point average on a 4.0 scale in undergraduate work.
2. Have an undergraduate major in social work which included a supervised field practice component, or have two years full-time practice in the field of social work.
3. Pass a qualifying examination administered by the School of Social Work faculty in early spring.

The accelerated programs begin either in the Memphis Branch in March or in the Nashville Branch 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 admission process. Applications should be filed not later than December 31 for the Memphis program and not later than January 31 for the Nashville program.

PART-TIME STUDENTS

Courses in the regular curriculum of the School are open to persons who meet the admission requirements for full-time study and who are planning to complete the work for the degree within the next two or three years. Application should be made to the School in the regular way, but the applicant should inform the Director of Admissions of the wish to begin part-time study on a planned basis.

TRANSFER CREDITS

Courses completed in another accredited school of social work are usually accepted for the University of Tennessee School of Social Work degree requirement providing the applicants meet the admission requirements of the Graduate School and The University of Tennessee School of Social Work. If previous coursework is equivalent to required or elective courses offered here, The University of Tennessee School of Social Work allows a maximum of 45 credit hours of graduate course work from 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 School. This work must be completed within the six-year period prior to the receipt of the degree. In addition, S/NC credit earned for the field practicum is also accepted.

Social work students majoring in fields other than social work are admitted to certain social work courses with the approval of the School of Social Work and the student's major professor.

Faculty

Courses
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only, E
5670 Social Work Research I (3) Research methodology as applied to problems in social work. Prereq: Permission of instructor. May be repeated. S/NC only.
5671 Social Work Research II (2) Continuation of Social Work Research I. W
5081 Evaluative Research in Social Work (2-3) Advanced research course. Topics include socio-political and organizational context of evaluative research, research methodology appropriate to evaluative research, and utilization of research findings. Prereq: Completion of core or consent of instructor. Sp
5082 Practicum in Social Work Research (3-5) Supervised practice in application of research methods and tools to social welfare program. Prereq: 5070-80 and consent of faculty member conducting investigation, S/NC only. Sp
5883 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 4 hrs. F, W, Sp
5090 Special Problems in Social Work (2-9) Individual study or research on problems of special significance to student's program, under supervision of major professor. May be repeated. F, W, Sp
5110 Social Welfare Policy and Services I (3) Internship and seminar focusing on contemporary social policy at local, state, national, and international levels of organization. Prereq: Completion of core or consent of instructor. F
5120 Social Welfare Policy and Services II (3) Internship and seminar focusing on contemporary social policy at local, state, national, and international levels of organization. Prereq: Completion of core or consent of instructor. F
5161 Social Welfare Seminar (2-3) Problem area or field of practice seminar focusing on substantive knowledge about social problem or condition and individual problems of the field. Prereq: Completion of core or consent of instructor. Sp
5170-20 Human Behavior and Social Environment I and II (3) Examination of theories pertaining to individual, family, and small group within context of functions, structures, roles and processes. Behavior of these systems conceptualized along functional and structural dimensions. Prereq: Completion of core or consent of instructor. F
5290 Special Accelerated Program in Social Work (15) Ten-week program providing qualified students with intensive academic and field practice experience that qualifies them to enter second year of graduate study and complete successful course of this term. S/NC only.
5310 Human Behavior and Social Environment (3-2) Deepens and extends student's knowledge or social work practice, focusing on nature of short-term treatment focusing on role of social worker as facilitator of knowledge and skills to use in social work practice. Prereq: Completion of core or consent of instructor. Sp
5313 Deviant Behavior of Children and Youth (2-3) Examination of useful to social work students of prose, drama, and poetry, which illuminate and expand knowledge and appreciation of every person's humanness. Prereq: Completion of core or consent of instructor. F
5321 Psychopathology and Social Deviance (3) Theories of and recent research in etiology of physical dysfunction and social variance. Prereq: Completion of core or consent of instructor. Sp
5332 Interpersonal Skill Development (2-3) Training group employed to enhance interpersonal-
5745 Professional Leadership in Social Work (2-3) Leadership in social welfare. Theories of leadership, complexity of leadership; function, effectiveness, and satisfactions of leaders; leadership styles, values, motivation and morale; and leadership development and training. Prereq: Completion of core or consent of instructor.

5761 Social Welfare Administration and Planning (2-3) Topics significant to the welfare delivery system, such as decision making, budgeting, planning, and programming. Prereq: Completion of core or consent of instructor.

5762 Seminar in Social Welfare Administration and Planning (3) To assist students in acquiring specific administrative and planning techniques appropriate for some welfare delivery systems. Prereq: Completion of core or consent of instructor.

5771 Information Systems and Decision Making (2-3) Decision making in human services organizations; formulation, delivery of services and evaluation of organizational performance. Information generation, collection, processing, storage, retrieval, and utilization 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) Centralized decision making related to allocation of scarce resources in social services organizations. Technical aids to budgetary choice and other aspects of financial management examined for utility, parsimony, and feasibility. Prereq: Completion of core or consent of instructor.

5800 Management of Residential Settings (2-3) Facilities and trends in management and programming in residential institutions for children, aged, mentally retarded, male and adult offenders, and other groups. Prereq: Completion of core or consent of instructor.

5812 Organizational Perspectives in Juvenile Justice (2-3) Aspects of juvenile justice system: overview of juvenile delinquency, introduction to theories of causation, role of police in detecting delinquency and apprehension of delinquents, police procedures, role of juvenile court, alternatives to institutions, correctional institutions, aftercare programs, and preventive strategies. Prereq: Second-year standing.

5820 Social Aspects of Illness (2-3) Social, economic, and emotional problems arising from or related to illness and disability as they affect individual, family, and community. Services needed to obtain optimum results from medical care. Lectures, discussion, illustrative case material. Sp

5825 Drugs: Use and Abuse (2-3) Survey and analysis of social, cultural, medical, and psychological factors underlying alcoholism and drug abuse; recent research and treatment innovations, social work with user and family. Prereq: Completion of core or consent of instructor.

5826 Social Work Treatment for Marital Adjustment (2-3) Theories regarding social and cultural values and trends in management and programming. 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 societies; and other problems of legal nature that affect social work.

5860 Social Gerontology (2-3) Physical, psychological, and social aspects of aging; economic and health status of aging; older person and family, community programs for aging; retirement—phenomenon of modern society.

5865 The Roles of Women (2-3) Roles and statuses of women; emphasis on contemporary American scene. Empirical research as well as popular literature. Ascribed and achieved facets of women's status in society.

5910-20 Field Practice (3, 4) Instruction and supervised practice in methods of social work with individuals, groups and communities. Prereq: Admission to the School (5140) or 5920. May be repeated.

5930-40 Field Practice (4, 8, 8) Specialized instruction and supervised practice in methods of social work treatment, administration, and planning in community health and welfare programs and agencies. Prereq: Admission to the School. Must be taken in sequence. S/NC only.

5951 Integrative Seminar (2) Required seminar facilitates integration of two-year M.S.S.W. program; attention given to current issues in profession and to pressing social problems. Student participation in symposia, discussions, simulations, and gaming situations prepares graduating student to assume positions of responsibility and leadership within profession. Graduating student helped to plan toward continuing his/her education and professional development. SNC 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. SNC only.

5980 Practicum in Governmental Social Welfare Policy Making (2-3) Practical introduction to progress of legislative and/or administrative policy making at state or local government level, through involvement in analysis of laws and regulations affecting a specified group of people. Limited social welfare policy research activities. Seminar to develop critical capability to evaluate new policy proposals and to analyze policy. Prereq: 5110 and consent of instructor. May be repeated.
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