Two separate applications must be completed: one application for admission to the Graduate School and one application for admission to the Industrial and Organizational Psychology program.

Deadline: For fall entrance, all materials should be received by the Vice Chancellor for Graduate Studies and Research no later than March 15 if you wish financial assistantship consideration.

Standards: At least 9 quarter hours of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade point average of 2.5 or above is required, with no evidence of special weakness in mathematics and physical sciences. Test scores of 500 or above also are necessary on the Graduate Management Admission Test, or on each section of the aptitude portion of the GRE. The advanced section for psychology is required.

THE DOCTORAL PROGRAM

I. Course Requirements
A. Minimum course requirements
1. Industrial Management or Psychology 5170, 5180, 5190 (Proseminar in Industrial and Organizational Psychology)
2. Statistics 5050-60-70 (Behavioral Statistics). Exemption by petition
3. Psychology 5070 (Academic Practicum)
4. Minimum of three 6000-level seminars to be selected from Psychology or Industrial Management 6250, 6260, 6270, and Industrial Management or Psychology 6380*
5. 36 hours of Psychology or Industrial Management 6000 (Doctoral Dissertation)

B. Recommended electives
1. For preparation for advanced section (61) GRE: Psychology Proseminar
2. For students who require preparation in psychometrics: Applied Psychometrics
3. For students who require preparation in management: Industrial Management 5110, 5120, 5230 (the latter is the same as Psychology 5450)
4. For students who wish to pursue special research interests aside from their dissertation: Industrial Management 5250, 5260, 5270 (Readings in Organizational Psychology) Industrial Management or Psychology 6000 (Supervised Field Research)
5. Courses available in areas related to industrial and organizational psychology:
   a. Through College of Business Administration: Wage and Salary Administration (Industrial Management 5220)

Seminar in Personnel Research (Industrial Management 5240)
Lab in Economics
b. Through College of Liberal Arts: Psychology 6450, 6460, 6470 Industrial Sociology

II. Program Requirements*
A. Attainment of a B average in the Proseminar in Industrial and Organizational Psychology.
B. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 on the GRE Advanced Test in Psychology.
C. Completion of a general preliminary examination in scientific methodology before beginning the third year of study, This examination covers the following areas: statistics, psychometrics, experimental design
D. Completion of a special preliminary examination in the area of the student's major research and professional interests. A student is expected to take this examination by the end of twelve quarters. This examination may be repeated once, normally no later than six months after the first attempt, at the discretion of the student's doctoral committee.
E. By the end of nine quarters a student is expected to choose a major advisor (Chairperson of Doctoral Committee).
F. Completion of an oral preliminary examination following the preparation of a doctoral dissertation, This examination covers the field of the doctoral research and related topics, and must be completed at least four weeks prior to the awarding of the degree.
G. Maintenance of at least 3.0 grade point average.

THE MASTER'S PROGRAM

I. Course Requirements
A. Industrial Management or Psychology 5170, 5180, 5190 (Proseminar in Industrial and Organizational Psychology)
B. Statistics 5050-60-70 (Behavioral Statistics) and Applied Psychometrics
C. Eighteen hours of additional course work to be selected primarily from among the 5000-level course offerings in industrial management and psychology (e.g., Industrial Management 5110, 5120, 6230; Psychology 5080 (Current Topics in Applied Psychology))

**Any student in the doctoral program may be required to prepare a Master's thesis by the Industrial and Organizational Psychology Committee. This policy will be implemented by the committee at such time as a review of the student's record suggests that additional data on the qualifications for pursuing a Ph.D. are required.

D. Nine hours of Psychology or Industrial Management 5000 (Master's Thesis)
E. Recommended: Psychology Proseminar

II. Program Requirements
The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of management problems in large organizations. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science course work will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program allows concentrated study in an area of application within the College of Business Administration. With the widespread application of management science technology, the student may (with the approval of the Management Science Committee) choose an applied concentration in a field outside the College of Business Administration.

Applications are encouraged from all majors, but mathematical background equivalent to the completion of at least two years of college calculus and proficiency in a computer language (e.g., Computer Science 3150) is required. The program is designed to be completed in one calendar year of full-time study, but applications are also encouraged from prospective part-time students.

Course Requirements

<table>
<thead>
<tr>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Science 5310-20-30-40</td>
</tr>
<tr>
<td>Applied Concentration Area (approved by advisor)</td>
</tr>
<tr>
<td>Statistics 5110</td>
</tr>
<tr>
<td>Statistics elective (5000 level or above)</td>
</tr>
<tr>
<td>Mathematics (4000 level or above)</td>
</tr>
<tr>
<td>Electives selected from mathematics, statistics, computer science, and/or management science</td>
</tr>
</tbody>
</table>

Total | 48 |
A thesis option is available which substitutes 9 hours of thesis credit for the following 12 hours of course work: Management Science 5340, one 3-hour course in the applied concentration area and 6 hours of electives in any area. The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee must approve a tentative overall program during the student's first quarter and must approve all courses on a quarter-by-quarter basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. For example, an undergraduate mathematics major with a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirement. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be asked to take such courses to fulfill the 6-hour mathematics requirement. The total course load will remain 48 hours for all non-thesis students and 45 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 18 as a function of prior background.

Prerequisites for Management Science Courses: The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior course work does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

For course listings and description of the Ph.D. program in Management Science, refer to the Department of Management Science, College of Business Administration.

University Studies
(Non-Departmental)

University Studies deal with important contemporary topics which are sufficiently comprehensive to require the study and attention of students and faculty from more than one college. They are open to all qualified members of the university community.

4100 Energy Needs and our Environment (3)
Not allowed for graduate credit for ecology majors.

Water Resources Development

MAJOR DEGREE
Water Resources Development M.S.

Floyd C. Larsen, Director,
Water Resources Research Center

Specific requirements for admission to this program are a Bachelor's degree in law, engineering, or one of the physical or social sciences from an accredited college or university, and evidence of ability to do work of graduate quality, as ascertained by undergraduate records. Also considered will be work record, if any, and letters of recommendation. The general policies and requirements of the Graduate School apply to this program.

The degree of Master of Science requires 45 quarter hours of graduate studies, including 6 hours of thesis work. The exact curriculum of each student is decided in consultation with a faculty committee, depending on the background and field of interest. If during the undergraduate work the student has, in the opinion of the faculty committee, sufficient training and education in one or more of the required courses, the student may substitute other elective courses. Electives will consist of advanced work in the student's specialty or in a related field.

3410 Principles of Ground Water Geology (3)
(Same as Geology 3410.)

3565 Introduction to Public Administrative Organization & Management (4) (Same as Political Science 3565.)

4110 Managerial Economics (3) (Same as Economics 4110.)

4810 Water Law (3) (Same as Environmental Engineering 4810.)

5000 Thesis

5130 Planning Research Methods I (3) (Same as Planning 5130.)

5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Planning 5160.)

5200 Water Resources Systems (3) (Same as Environmental Engineering 5200.)

5330 Descriptive Hydrology (3) (Same as Environmental Engineering 5330.)

5340 Hydrology of Agricultural and Forest Lands (3) (Same as Agricultural Engineering 5340.)

5410-20-30 Interdisciplinary Seminars (3, 3, 3)
Problems relating to comprehensive water resource development including flood management, hydroelectric power, navigation, recreation, alternatives in water resource planning, tomorrow in today's planning, project formulation and justification, direct and indirect economic consequences, state and local participation, and municipal and industrial uses of water developments.
Robert G. Landen, Dean
Charles O. Jackson, Associate Dean
Boyd L. Daniels, Assistant Dean for Student Academic Affairs

The College of Liberal Arts offers programs leading to eight advanced degrees.* See page 9 for degrees and majors.

Departments of Instruction

Numbers in parentheses following the course titles indicate quarter hours credit offered.

Anthropology

MAJOR
Anthropology

DEGREE
M.A., Ph.D.

Professors:
W. M. Bass (Head), Ph.D. Pennsylvania; C. H. Faulkner, Ph.D. Indiana; A. K. Guthe, Ph.D. Michigan; F. W. Parmalee, Ph.D. Texas A. & M.

Associate Professors:
I. E. Harrison, Ph.D. Syracuse; R. L. Jantz, Ph.D. Kansas.

Assistant Professors:
J. M. Bishop, Ph.D. California (Berkeley); W. E. Klippel, Ph.D. Missouri; M. H. Logan, Ph.D. Pennsylvania State; G. F. Schnoedl, Ph.D. Washington State; F. H. Smith, Ph.D. Michigan.

THE MASTER'S PROGRAM

The formal requirements for the Master's degree include:

1. A minimum of three quarters of residence at the University of Tennessee.
2. A minimum of 45 quarter hours for graduate credit, including preparation of thesis. Thirty-six of these 45 hours must be in anthropology, 9 hours may be taken in closely related disciplines (at least one-half of the courses must be at the 5000 level).
4. A thesis. In addition to the two (2) copies required by the Graduate School, one bound copy of the thesis is to be presented to the department and one bound copy to the student's thesis advisor.

THE DOCTORAL PROGRAM

Although there is no minimum credit hour requirement for the Ph.D. degree, students in this program should plan to devote to its attainment no less than 3 years beyond the B.A. level, and to complete the following requirements:

1. Admission to Ph.D. program through passing the Graduate Evaluation Examination at completion of first year of study, or through departmental acceptance of a previously earned M.A. degree in Anthropology.
2. Formation of an advisory committee and establishment in consultation with that committee of a program of study. Delineation of field(s) of competence by the student and committee and subsequent presentation to graduate advisor.
3. Demonstration of competence in a foreign language as determined by the student's committee.
4. Successful completion of oral and written comprehensive examinations and admission to candidacy.
5. Successful completion of the dissertation and final oral examination.

3070 Genetics and Society (3) (Same as Botany 3070).
3410 Principles of Cultural Anthropology (3) Basic concepts and objectives in the study of culture. The range of cultural phenomena and approaches to its study. Prereq: Human Culture recommended.
3440 Religion of Primitive Peoples (3) The religions of nonliterate peoples. The place of religion in their social and cultural systems. Prereq: Human Culture recommended. (Same as Religious Studies 3440.)
3450 Community Studies in Complex Culture (3) Review of cross-cultural comparative urban and village communities and methodologies used in community studies. Prereq: Human Culture recommended.
3510 Peoples and Cultures of Mainland Asia (3) Ethnographic survey of the indigenous cultures of mainland Asia. Cultural diversity and human ecology in areal perspective. Prereq: Human Culture recommended.
3530 Peoples and Cultures of Africa (3) Ethnographic survey of the aboriginal cultures of sub-Saharan Africa. Cultural diversity and human ecology in areal perspective. Prereq: Human Culture recommended.
3550 North American Indian (3) An ethnographic survey of the cultures of the Arctic, Southwest, Plains and Eastern Areas. Emphasis on the cultural differences of peoples occupying these areas during the precolonial period. Prereq: Human Culture recommended.
3555 Cherokee Ethnohistory (3) Survey of sociopolitical aspects of internal affairs and external relationships from first European contact to present. Emphasis on eighteenth and nineteenth centuries.
3560 Archaeology of United States and Canada (3) Survey of prehistoric peoples north of Mexico from initial occupation to European contact. Prereq: Prehistoric Archaeology recommended.
3620 European Prehistory I (3) Cultural developments during the Paleolithic, Mesolithic, and Neolithic. Prereq: Prehistoric Archaeology recommended.
3630 European Prehistory II (3) Cultural developments during the Metal Ages. From the close of the Neolithic through the Iron Age. Prereq: Prehistoric Archaeology recommended. 3620 and 3630 should be taken in sequence.
3840 Ancient Civilization of Mesoamerica (3) Introduction to the archaeology of areas of advanced Indian culture in Mexico and Central America beginning with the earliest cultures and proceeding to contact with Europeans. Prereq: Human Culture recommended.

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

3870 Principles of Archaeology (3) Research strategies in archaeological excavation, interpretation, and explanation. Prereq: Prehistoric Archaeology or consent of instructor.

3700 Forms of Folklore (4) An introduction to the anthropological study of folklore.

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

3800 Language and Culture (3) Relationship between linguistic categories and patterns of culture. Prereq: Introduction to Linguistic Anthropology or consent of instructor. Recommended: Human Culture.

3811 Introduction to Mesoamerica (3) (Same as Art 3911).

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


3930 The Biology of Races of Man (3) Processes of racial differentiation; criteria of significant differences among existing stocks; influence of biology and culture in race formation; analysis of studies concerning blood groups, racial mixture, constitution, growth and nutrition. Prereq: Human Origins recommended.

3950 Human Identification (3) Introduction to techniques used in identification of human skeletal material in forensic medicine.

4200 Contemporary North American Indian (3) Survey of Indian cultures from initial Euro-American contact to the present; emphasis on cultural change, U.S. Government Indian policy, reservation life; contemporary Southeastern Indian cultural preservation and development. Prereq: Human Culture or consent of instructor.

4210 Ethnographic Research Techniques (3) Methods of collecting, ordering and utilizing data. Prereq: Consent of instructor.

4240 Applied Cultural Anthropology (3) Applications of anthropological theory, methods and findings in programs of community and national development, public health, international aid, and military assistance. Examination of the roles of anthropologists, questions of values and ethics in intervention schemes, and of the organization of planned changes in applied programs. Intensive analysis of selected case studies. Prereq: Human Culture or consent of instructor.

4250 Medical Anthropology: Lecture (3) A survey of medical anthropology. Emphasis is on Western medical systems which coexist with Western technical medicine. Prereq or coreq: 4250.

4300 Readings in Anthropology (1-9) Intensive reading, problem oriented. Prereq: Consent of instructor.

4340 Field Work in Archaeology (3-9) Practice in the collection and analysis of human biological data. May include either skeletal or living populations. Prereq: 3 quarters of introductory archaeology and consent of instructor. May be repeated. Maximum 9 hrs.

4350 Field Work in Cultural Anthropology (3-9) A practical fieldwork lecture and seminar course emphasizing fieldwork reporting, survey and interview techniques, and the devising and carrying out of fieldwork projects. Prereq: 3 quarters of introductory anthropology and consent of instructor. Strongly recommended: 4210. May be repeated. Maximum 9 hrs.

4360 Field Work in Physical Anthropology (3-9) Practice in the collection and analysis of human biological data. May include either skeletal or living populations. Prereq: 3 quarters of introductory anthropology and consent of instructor. May be repeated. Maximum 9 hrs.

4400 Cultural Ecology (3) Survey of concepts and methods in studying the dynamic interaction between cultures and their environments. Topics include ecological theory, methods of analysis, and application from selected case studies. Prereq: Human Culture, Human Origins or consent of instructor.

4410 Non-Western Education: Anthropological Approaches (3) Analysis of problems resulting from application of Western models of education in developing societies and in aboriginal communities within industrialized societies (e.g. American Indians).

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


4440 Urban Anthropology (3) Survey of theoretical and methodological issues in urban anthropology. Emphasis on the roles of anthropologists in researching cross-cultural urban settlements. Focus is on anthropological perspectives on problems and planning. Prereq: 4350 or consent of instructor.

4460 Current Trends in Anthropology (3) An analytical integrative review in symposium on the current debates, research directions, theories, fieldwork methods, and general assumptions of the four subfields of anthropology: archaeology, physical anthropology, linguistics, and cultural anthropology.

4480 Cross-cultural Survey of Sex Roles and Behavior (3) Examination of sex roles and sex behavior from cross-cultural and diachronic viewpoints. Draws disparate and scattered studies together and attempts to arrive at conclusions on questions as how sex roles are learned, the parameters of acceptable sexual behavior and degrees of tolerance for sexual deviation in various cultures.

4500 Peoples of China I: Chinese Society Before 1839 (3) An anthropological survey of Chinese society and culture during the pre-World War II, dynastic and early Western contact periods. Prereq: Human Culture or consent of instructor. Recommended: 3510 or an East Asian course.

4510 Peoples of China II: Chinese Society After 1839 (3) An anthropological survey of Chinese society and culture in the period of intense Western contact, rejection of the West, and development of modern, communist Chinese society and culture. Prereq: Human Culture, or consent of instructor. Recommended: 4500, or an East Asian course.

4550 Indians of the Southeastern United States (3) Survey of ethnology, culture areas, and customs; emphasis on aboriginal adjustment to environment; lifeways of Southeastern Amerindian groups for the period before contact. Prereq: Human Culture, 3540, or consent of instructor.

4560 Cherokee Ethnology (3) Intensive survey of ideology and material aspects of Cherokee culture existing at time of first European contact.

4570 Peoples of Southeast Asia (3) Survey of representative ethnic groups and indigenous cultures of mainland and island Southeast Asia. Problems of contemporary culture changes. Prereq: Human Culture, or consent of instructor, or an East Asian course.

4580 Asians in the Americas Since 1800: Anthropological Perspectives (3) Character, factors, and motivations in Asian Immigration to North, Central and South America. Assimilation, acculturation, and ethnic identity. Prereq: Human Culture or consent of instructor, recommended 3510 or an East Asian course.

4600 Method and Theory in American Archaeology (3) The historical development of New World archaeology with emphasis on method and field techniques. Prereq: Prehistoric Archaeology or consent of instructor.

4610 African Prehistory (3) Survey of cultural history in Africa, from earliest evidence of human life to present. Prereq: Human Culture or consent of instructor, recommended 3510 or an East Asian course.

4620 Zooarchaeology (3) Basic osteological studies of vertebrate classes; emphasis on the life of domesticated and wild animals in his subsistence and culture. Identification, analysis and interpretation of archaeologically derived molluscan and vertebrate remains.

4650 Archaeology of Southeastern United States (3) Intensive study of the prehistoric American Indian. Special emphasis on Tennessee Indian culture. Prereq: 3510 or consent of instructor.

4720 American Folklore (3) Anthropological perspectives on the folklore of geographical regions and ethnic groups of the United States. Prereq: 3310 or 3320 or consent of instructor.

4740 Southern Appalachian Folk Culture (4) Research-oriented course dealing with a wide range of traditional culture in Southern Appalachia: settlement patterns, folk housing, economy, clothing, beliefs, speech, art, song, dance, and oral traditions and customs. Prereq: Consent of instructor. May be repeated.

4750 Mexican Folklore (3) Anthropological perspectives on the folklore of Mexico and the Spanish-speaking southwestern United States. Prereq: 3700 or consent of instructor and a reading knowledge of Spanish.

4780 Cherokee Language (3) Linguistic survey of structure of the Cherokee language.

4820 Physical Growth and Constitution (3) Comparative growth patterns throughout the life cycle of man, skeletal and dental maturational differences in growth, human constitutional types. Prereq: First quarter general anthropology. Strongly recommended: General Genetics or consent of instructor.

4950 Primate Studies (3) Survey of field and laboratory investigation of the anatomy and nonhuman primate behavior. Prereq: Human Origins or consent of instructor.
4960 Primate Paleontology (3) Survey of fossil primate forms; the origin and evolution of major primate lineages; hominid ancestry. Prereq: Consent of instructor.


5000 Thesis

5010 Graduate Research (1-9) Independent investigation of special problems in anthropology.

5100 Seminar in Cultural Anthropology (3-9)

5101 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

5103 Independent Study (1-12) See page 148.

5140 Seminar in Zooarchaeology (3) Approaches to the analysis and interpretation of archaeological faunas. Intensive reading; evaluation and discussion of faunal studies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5149 Laboratory Studies of the Vertebrate Skeleton (4) Examination and comparison of skeletons of the major groups of fish, amphibians, reptiles, birds, mammals. Oriented toward the identification of archaeologically-deposited faunas. May be repeated. Maximum 6 hrs.


5160 Seminar in Archaeology (3-9) Theoretical and practical issues central to contemporary archaeology. Prereq: Permission of instructor. May be repeated. Maximum 9 hrs.

5200 Special Topics in Anthropology (3) Lecture and/or seminar course for advanced students on a selected topic of current interest to the field of anthropology as a whole. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5210 Community Anthropology: The Local Community (3) Courses dealing with ethnic identity, perception, and research methods on the local community. Prereq: 4440 or consent of instructor.

5340 Fieldwork in Anthropology (3-9) Practicum work: surveying, excavating, processing, and analyzing of data; intensive reading. Prereq: 9 hours of introductory anthropology and consent of instructor. May be repeated. Maximum 9 hrs.

5400 History of Anthropological Theory (3) Review of theoretical contributions of the more influential anthropologists. Prereq: Consent of instructor.

5440 Peasant Societies (3) Critical analysis of existing literature and theories regarding rural-urban polarities, interactions, and contemporary manifestations of agricultural populations. Prereq: Consent of instructor.

5460 Comparative Social Organization (3) Societies in different sociocultural settings; kinship, age, sex, locality, and other factors in determining relations between individuals and groups. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5460 Quantitative Methods in Anthropology (3) Application of quantitative methods to anthropological data. Emphasis on correlation and regression techniques, procedures, distance analysis, discriminant analysis, and implementation of computer routines. Prereq: Statistics and prob.


5510 Seminar in Ethnology of Western North American Indians, emphasizing cultural patterns and ethnohistorical trends of typical western groups. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5600 Theory in Archaeology (3) Review of development of archaeological theory. Coverage up to and including recent systems approaches.

5610 Problems in North American Archaeology (3) Graduate seminar designed to explore specific research problems in North American archaeology. Research topics on prehistoric ecology and settlement patterns in North America. Prereq: Consent of instructor. May be repeated once.

5620 Problems in Old World Archaeology (3) Selected topics and research problems in European and African prehistory will be investigated in depth. Prereq: Consent of instructor. May be repeated once. (Same as Classics 5620).

5630 The Maya (3) Intensive survey of Mayan culture from earliest times to the present. Prereq: 3580.

5640 Archaeological Resource Management (3) Theory and practice—public, conservation, contract, and salvage/research archaeology. Special emphasis on: legislation, contracts, responsibilities, and certification; agencies and policies; project design, administration, and logistics; standards of field work, analysis and publication; archaeology and the public; conservation archaeology as a career. May be repeated. Maximum 6 hrs.

5660 Seminar in Prehistoric Lithic Technology (3) Analysis of techniques employed in protection of prehistoric stone industries; raw materials employed; resultant implements, their morphology and function; and typological constructs utilized in archaeological analysis. Prereq: Consent of instructor.

5670 Seminar on Aboriginal Lithic Resources (3) Training in the use and utilization of prehistoric stone materials utilized by prehistoric populations—their properties, natural occurrence and geologic context, relationship to aboriginal, occurrence and distribution, processing and ultimate forms and functions. Emphasis is on theory and implementation of regional resource surveys and on discrete regions in terms of lithology and cultural homogeneity, particularly East and Middle Tennessee. Course work includes input from professional geologists, and field research. Prereq: 5660 recommended.

5700 Theory in Folk Culture Studies (3) Graduate seminar analyzing major theoretical viewpoints of European and American folklorists and folklore studies from inception to present.

5710 Problems in Folk Culture Studies (3) Topical seminar dealing with selected problems and aspects of traditional behavior in European-American culture. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5900 Dental Anthropology (3) Dental anatomy, theories of dental evolution, genetic and environmental influences controlling dental morphology, dental trait analyses, use of the dentition for skeletal aging, and dental casting. Prereq: 3900.

5910 Measurement of Man (3) A survey of the techniques of measuring and describing skeletal material and the human subject with emphasis upon the practical applications to growth and nutrition and human engineering. Prereq: Consent of instructor.

5920 Advanced Physical Anthropology (3) An intensive investigation of the theory and problems in physical anthropology.

5930 The Human Skeleton in Forensic Medicine (3) The application of physical anthropo-

5940 Skeletal Biology of Early Human Popu-

5950 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting the human skeleton. Prereq: Zoology 5320.

5960 Dermatoglyphics (3) Methods of derma-

5970 Emergence and Early Evolution of Man (3) A detailed study of the ancestry and evolutionary significance of the Australopithecines. Prereq: 4970 or consent of instructor.

5980 Reanderthal Man and Human Evolution (3) An in-depth consideration of the morphology, distribution and evolutionary relationships of the Reanderthals. Prereq: 4970 or consent of instructor.

5990 Human Variation (3) Nature of human biological variation with emphasis on micro-

6000 Doctoral Research and Dissertation

6410-20-30 Seminar in Cultural Anthropology (3, 3, 3) This seminar is offered each quarter primarily for doctoral candidates.

6480 Seminar in Social Structure (3) This seminar examines the existing literature on kinship systems and especially focuses upon synthesis of those data.

6510 Selected Topics in Archaeology (3) May be repeated. Maximum 9 hrs.

6910 Selected Topics in Physical Anthropology (3) May be repeated. Maximum 9 hrs.

6970 Seminar in Human Paleontology (3) Prereq: 4970 and consent of instructor.
Art

MAJOR DEGREES
M.A., M.F.A.

Professors:
D. F. Kurka (Head) Ph.D. Chicago; W. H. Stevens, M.F.A. Illinois; C. G. Sublett, M.F.A. Virginia;

Associate Professors:
R. C. Kennedy, M.F.A. Wisconsin; L. Peacock, Ph.D. Chicago; W. H. Stevens, M.F.A. Illinois;

Instructors:
T. A. Evans, Alabama; P. R. Livingston, M.F.A. Wisconsin;

Art

The Art Department offers two graduate degrees: Master of Arts and Master of Fine Arts. In order to become a candidate for either of these degrees, the applicant must first be admitted to the Graduate School and be accepted by the Art Department. The general requirements are that the applicant must have an undergraduate major in art or present evidence of outstanding proficiency. In addition to the general admission requirement, Art Department acceptance is based on recommendations and a portfolio of work.

MASTER OF ARTS

Major areas consist of painting, communication design, printmaking, and sculpture. One year of residence is required.

Curriculum:

Thesis ........................................ 9 hrs
Major area .................................. 12 hrs
Drawing and composition .................. 3 hrs
Art history .................................. 9 hrs
Electives .................................... 12 hrs
Total ......................................... 45 hrs

GREENE

The thesis is a critical essay relevant to the field of concentration. The M.A. thesis may not be used to fulfill the project in lieu of thesis requirements for the M.F.A. A graduate exhibition is required. Final examinations are oral.

MASTER OF FINE ARTS

The Master of Fine Arts is the terminal degree in studio art. Residence of at least five quarters beyond the baccalaureate degree is required. Residence is defined by the Art Department as (1) a minimum enrollment of 6 hours per quarter, and (2) use of Department of Art facilities, so that discussion and criticism is available to students.

Curriculum:

Projects in lieu of thesis
(5011-21-31) .................................. 9 hrs
Major area .................................... 27-33 hrs
Seminar in art history ....................... 3 hrs

* Six to 12 hours to be decided by the student's committee on the basis of the undergraduate preparation. Any reduction from the 12 hours in art history would be added to the basic 9 hours of art electives.

**Electives must be outside the departmental major area and may be any course offered by the University for graduate credit.

Classification of Art Courses

A. Studio Art: 3516, 3517, 4015, 4115, 4215, 4315, 4415, 4515, 4525, 4534, 4545, 4615, 4616, 4617.
B. Art History: 3705, 3715, 3716, 3725, 3726, 3735, 3736, 3745, 3755-56, 3765, 3775-76-77, 3811, 4865-56, 4875-76-77.

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

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


3705 Northern European Painting: 1350-1500 (4) Painting and printmaking of the low countries, France, Germany, and England. Includes international style manuscripts, Van Eyck, Bosch, Dürer, Holbein, and Bruegel.


3719 Art in Southern Europe and New World in Sixteenth Century (4) Italy, Spain and Latin America, 1475-1600. Emphasis on Leonardo, Michelangelo, El Greco, Caravaggio, Dürer, Titian, Tintoretto, Veronese, and artistic relations between Iberia and Latin America.

3725 Art of Southern Europe and New World in Seventeenth and Eighteenth Centuries (4) Emphasis on El Greco, Caravaggio, Zurbaran, Velazquez, Bernini, Tiepelo, Goya, artistic relations between Iberia and Latin America, and the urban development of Rome.


3746 History of Modern Sculpture in Europe and America (4) From 1800 to 1900: Neoclassicism to Rodin. From 1900 to present: Brancusi, Cubism, Constructivism, Cubism, Constructivism, Collage, SURREALISM, GEOMETRIC ABSTRACTION, SOCIAL COMMENTARY PAINTING, ABSTRACT EXPRESSIONISM IN THE U.S.A. AND PARALLELS IN EUROPE, POP, OP, MINIMAL, AND CONCEPT ART.

3755-56-57 Studies in Art History (4, 4, 4) Concentration in selected areas. Prerequisite: 9 hours of art history or consent of instructor.

3765 History of North American Art (4) Survey of landscapes in painting, architecture, sculpture, and design from prehistory to 1900.

3766 History of Twentieth-century American Art (4) Analysis of developments in architecture, painting, sculpture, and design from 1900.

3775 Art of Indian Asia (4) Survey of Indian art with consideration of art of Central Asia and Southeast Asia.

3776 Chinese Art (4)

3777 Japanese Art (4)

3811 Introduction to Museology (3) Concepts, practices and historical development of museum functions, history, and museum studies. (Same as Anthropology 3811.)

4015 Individual Problems (4) May be repeated. Maximum 12 hrs. Prerequisite: Consent of instructor.
Audiology and Speech Pathology

MAJORS

Audiology

Speech and Hearing Sciences

Ph.D.

Speech Pathology

M.A.

Professors:

H. L. Luper (Head), Ph.D. Ohio State; S. Adler, Ph.D. Ohio State; C. W. Apl, Ph.D. Ohio State; D. M. Lipscomb, Ph.D. Washington; H. A. Peterson, Ph.D. Illinois; B. Silverstein, Ph.D. Purdue.

Assistant Professors:


Speech Pathology

Audiology

THE MASTER'S PROGRAM

A major is offered in Audiology or in Speech Pathology. A minor is offered in each of the two areas when approved by the department.

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

Students majoring in the two areas are expected to complete the academic requirements for clinical certification from the American Speech and Hearing Association, including the required number of clock hours of clinical practicum.

An exception to this rule needs approval from the Department Curriculum Committee. Enrollment in clinical practicum courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient course work in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students may elect either the thesis program or the non-thesis option. Students in both programs are required to take 5110 and 5119. The Master's program with the thesis will include a minimum of 45 quarter hours of approved graduate credit, including 9 quarter hours of 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least one-half of these quarter courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 45 quarter hours of approved graduate credit and pass a final written examination. A minimum of 24 quarter hours must be at the 5000 or 6000 level. The decision as to the choice of the thesis or non-thesis program is normally made following completion of 5110 and a conference with the student's advisor.

THE DOCTORAL PROGRAM

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

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

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

Specific programs of study will be determined by the student in consultation with his faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philosophy in Speech and Hearing Sciences will include:

1. Successful completion of course work in the study of one or more research tools, or other specific scientific methodological vehicles pertinent to the research interests of the candidate. The choice of research tool(s) is subject to departmental approval.
2. A minimum of 9 quarter hours of graduate credit obtained in course work in a cognate field outside the Department of Audiology and Speech Pathology. These hours are in addition to those required in Item 1 above.
3. Sufficient course work within the department but outside the area of specialization to give a broad foundation and understanding.
4. A comprehensive examination to demonstrate a general knowledge of the bases of audiology, speech and
College of Liberal Arts

4040 Appraisal of Speech and Language Disorders (4) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic test. Prereq: Phonetics. (Same as Special Education 4040.)

4060 Speech Science II (3) Speech production: clinical applications of speech science research. 2 lectures and 1 2-hr lab per week. Prereq: Speech Science I.

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

4190-200 Speech Development of the Hearing Impaired (3, 3) (Same as Special Education 4190-200.)

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

4230 Introduction to the Education and Psychology of the Hearing Impaired (3) (Same as Special Education 4250.)

4310 Stuttering (4) Nature and treatment. Review and integration of various theories. (Same as Special Education 4510.)

4320-30-40 Clinical Practice in Speech Pathology (1-4, 1-4) Prereq: Introduction to Speech Pathology, Phonetics, Articulation Disorders, 4040, and consent of instructor. 4320 max. may be repeated. S/NC only. (Same as Special Education 4320-30-40.)

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

4450-60-70 Clinical Practice in Audiology (1-6, 1-6, 1-6) Prereq: 4720, 4939, or 4940. S/NC only. (Same as Special Education 4450-60-70.)

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

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

4560 Problems in Audiology (1-6) Prereq: Consent of instructor. May be repeated. Maximum 5 hrs.


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

4700 Audiology for Educators of the Deaf (4) Fundamental aspects of hearing, including physics of sound, anatomy and physiology of the ear, audiology and rehabilitation of hearing loss and basic audiometric techniques. May not be used to satisfy requirements of major in Audiology and Speech Pathology.

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

4750 Noise in the Environment (3) Discussion of the extent to which the noise problem exists, introduction to methods of noise measurement, basic techniques in sound and vibration analysis, acoustical factors, and physiological concomitants in noise stimulation. A knowledge of acoustics is advisable.


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

4938 Laboratory in Aural Rehabilitation (1) (Same as Special Education 4939.)

4940 Advanced Aural Rehabilitation: Acoustic Training (4) Development of maximum use of residual hearing in the acoustically handicapped. (Same as Special Education 4940.)

5000 Thesis

5052 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.

5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. (Same as Special Education 5040.)

5045 Practicum in Hearing Aid Orientation and Communication Counseling (1-6) Practical exposure to counseling the hard of hearing and their family members concerning use and expectations of hearing aids as well as suggestions for better use of communication skills. Prereq: Consent of instructor, 4720. May be repeated. Maximum 9 hrs. S/NC only.

5050 Practicum in Aural Habilitation (1-6) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5051 Practicum in Aural Habilitation (1-6) Enrollment by consent of instructor may be repeated. Maximum 9 hrs. S/NC only.

5060 Anatomy and Physiology of Speech (3) Structure and function of the neuromuscular system involved in breathing, phonation, resonance, and articulation. Prereq: Speech Science II.

5070 Anatomy and Physiology of Hearing (3) Structure of the human ear, pathology of hearing impairment, and psychoacoustics of audition. Prereq: 4710.

5071 Physiological Acoustics (3) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by the ear, distortion in the ear, and the ear as an analytic mechanism. Prereq: 4710, 4720, Speech Science II, or approval of the instructor.

5100 Comparative Anatomy of the Peripheral Auditory Structures (3) Tutorial laboratory course in study of anatomy of the temporal bone employing microscopic dissection techniques. Prereq: 5070 or consent of instructor.

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

5117 Instrumentation in Audiology and Speech Pathology (2) Principles of instrumentation used in audiology and speech pathology. Prereq: Basic Acoustics in Speech and Hearing.

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

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

5201 Aphasia (3) A historical review of aphasia literature including theories of brain functioning, aphasic classification and terminology, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 4350 or equivalent or consent of instructor.

5230-30-40 Advanced Clinical Practice in Speech Disorders (1-6, 1-6, 1-6) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5250-60-70 Advanced Clinical Practice in Speech Diagnosis (1-6, 1-6, 1-6) Prereq: 4040, 4540 or equivalent. Maximum 9 hrs. S/NC only.

5380 Cerebral Palsy (3) Study of cerebral palsy with emphasis on neurological foundations and speech and language training. Prereq: Articulation Disorders. (Same as Special Education 5380.)

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

5440 Hearing Aid Evaluation (3) Study of the procedures involved in assessment of hearing loss and selection of aural amplification for the acoustically handicapped. The pertinent research in the areas of evaluation methods, binaural versus monaural, prescription fitting, will be reviewed. Prereq: 4720.

5450 Sound Measurement and Analysis in Hearing Conservation (3) Study of noise measurement systems and their applications in various areas of audiology, and study of the role of the audiologist in industrial hearing conservation. Prereq: Consent of instructor.

5460 Differential Diagnosis of Auditory Disorders (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with special reference to differential diagnosis. Prereq: 4720.

5470 Impedance Measurement in Audiology (3) Theoretical considerations behind the emergence of impedance measurement in the clinical measurement of hearing. The course will include practical experience in using several impedance measuring devices. Prereq: 4710, 4720, 5070 or consent of instructor.

5490 Practicum in Hearing Conservation (1-6) Supervised on-site experience in hearing conservation programs at industrial installations. Prereq: 4700, 4750. May be repeated. Maximum 6 hrs. S/NC only.

5500 Seminar in Audiology (3) Study of significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

5503 Seminar in Advanced Audiological Procedures (3) Theoretical and practical considerations of audiological procedures used for differentiation between cochlear versus retrocochlear auditory lesions, identifying central auditory lesions, and for identifying nonorganic hearing loss.
College of Liberal Arts

DEGREES

109

6509 Directed Study in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6520 Advanced Seminar in Speech and Language (3) Topics vary from quarter to quarter but include advanced study of specific topics related to aberrations of voice, articulation, speaking time and rhythm, language development or use, and language symbolization. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

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

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

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 9 hrs.

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

Biochemistry

MAJOR

Biochemistry

DEGREES

M.S., Ph.D.

Professors:

K. J. Monty (Acting Head), Ph.D. Rochester; J. E. Churchich, Ph.D. Sheffield (England); T. P. Smith, Ph.D. Michigan; J. G. Totter, Ph.D. Iowa State.

Associate Professor:

S. W. Hawkins, Ph.D. Chicago; J. G. Joshi, Ph.D. Poona (India).

Assistant Professors:

R. Bryant, Ph.D. Illinois; R. H. Feinberg, Ph.D. California (Berkeley); L. Huang, Ph.D. Michigan State.

THE MASTER'S PROGRAM

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

1. Introductory Organic Chemistry with laboratory (at least one year)*, Inorganic Quantitative Analysis* (e.g., at least one quarter of analytical chemistry), Organic Qualitative Analysis* (e.g., Chemistry 4510), Introductory Physics*, Differential and Integral Calculus*; at least three quarters of approved graduate courses in chemistry or physics, for example: Organic Reaction Mechanisms (e.g., Chemistry 5110-20-30-35), Quantum Chemistry (e.g., Chemistry 5340), Advanced Physics (Physics 5210-20-30), Infrared and Raman Spectroscopy (Physics 5440), Radiation Chemistry (Physics/Chemistry 5460), Advanced Thermodynamics and Statistical Mechanics (Physics 5110-20-30); plus minimum of three quarters of advanced physical chemistry (e.g., Biochemistry 4210-20-30, Chemistry 3410-20-30) and at least 18 hours of biology beyond the introductory level.

2. Biochemistry 4110-20, 5110, 5120, 5130, 5220, 5310, 5230.

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

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

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

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

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

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

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

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

4116-20 Cellular and Comparative Biochemistry (4, 4) Electrolyte behavior; the chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture; amino acid metabolism; nucleic acid function; protein synthesis and biochemical genetics; the regulation of biological processes must be taken in sequence. Prereq: Organic Chemistry and an introductory course in biology. 3 lectures and 1 discussion.

4119 Cellular and Comparative Biochemistry Laboratory (2) Basic biochemical procedures of general application in biochemistry and molecular biology. Prereq: 1 quarter of analytical chemistry. Prereq or coreq: 4110.

4210-20 Introduction to Physical Biochemistry (3, 3) 4210—Introduction to thermodynamics; phase stability and phase changes; chemical potential; osmotic pressure; activity and the Debye-Hückel model; electrochemistry; membrane permeability; 4220—Elements of statistical mechanics, diffusion, collision theory; chemical kinetics and transition state theory; higher order kinetics; the specialized kinetics of enzymatic processes; some biopolymer considerations. Prereq: Single Variable Calculus, Organic Chemistry, and an introductory course in biology.

4230 Introduction to Physical Biochemistry (3) Physical characterization of macromolecules; polarization; fluorescence, sedimentation and transport hydromedians, electrophoretic mobility, light scattering, and crystallography of proteins of nucleic acids. Prereq: Biochemistry 4220 or Chemistry 4340, or equivalent.

5000 Thesis

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


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

5130 Protein Structure and Enzyme Function (3) Physicochemical properties of proteins; primary, secondary, tertiary and quaternary structure; denaturation, renaturation and other conformational change; structure-function correlations; enymology-specific models of catalysis; steady state relaxations; allostery and kinetic aspects of catalysis. Prereq: 4110 and either 4220 or Chemistry 3430.

5220 Structures and Functions of the Nucleic Acids (3) Chemistry of the nucleic acids; hydrodynamic behavior and double-stranded structures; coiling, supercoiling, and other higher order structural considerations; the biosynthesis of DNA and RNAs; repair mechanisms; degradation 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 codes; regulation of transcriptional and translational events (Induction, repression, etc.) Prereq: 4110-20.

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

5310-30 Experimental Techniques (2, 2, 3) A tutorial laboratory course in modern experimental methodology and instrumentation. Intended primarily for departmental majors.

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

5510 Properties of Biomolecules Related to Function (3) The structures, chemical and physical properties of biomolecules will be developed from the theoretical and experimental points of view to explain their actions and interactions. Prereq: 1 yr of Organic Chemistry; Analytical Chemistry recommended. Prereq or coreq: 4210, Chemistry 4910 or equivalent.

5520 Molecular and Cellular Basis of Metabolic Regulation (3) Regulation of metabolic pathways dependent on energy demands of the organism and on synthesis of macromolecules. Prereq: 5510 or consent of department. Coreq: 4220 or Chemistry 4920 or equivalent.


6000 Doctoral Research and Dissertation

6010 Advanced Biochemistry Seminar (1) The topics to be covered will be posted in the spring quarter for the following year. Invited speakers of note will participate. The title of the topic covered will be printed on the student's record. May be repeated. Maximum 9 hrs.

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

Biology

MAJOR

DEGREE

Biology

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: Biology, Chemistry, Botany, Microbiology and Zoology. Inquiries regarding the program should be addressed to the chairman of the committee. The admission requirements are:

1. Bachelor's degree with satisfactory record.

2. Nine quarter hours of college mathematics.

3. Twelve quarter hours of physical sciences.

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

5. Eighteen quarter hours of advanced biology courses.

Requirements for the degree:

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

A. Eight quarter hours in each of the following:

1. Taxonomy and/or Ecology.
2. Morphology, Developmental Biology and/or Anatomy.
3. Physiology and/or Biochemistry.
4. Genetics, Cytology and/or Cytochemistry.

B. Eighteen quarter hours of graduate credit in each of the following four fields: biochemistry, botany, microbiology, zoology or 36 quarter hours of graduate credit among the four fields as specified by the interdepartmental committee administering the MACT program in Biology.

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

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

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

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

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

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

Botany

MAJOR

DEGREES

Botany

M.S., Ph.D.

Professors: R. W. Hofstee (Head), Ph.D. Michigan; E. C. Clebsch, Ph.D. Duke; H. R. DeSelm, Ph.D. Ohio State; W. R. Herron, Ph.D. Vanderbilt; L. H. Hester (Emeritus), Ph.D. Cornell; L. W. Jones, Ph.D. Texas; J. F. McMinnick, Ph.D. Emory; F. H. Norris, Ph.D. Ohio State; J. S. Olsen, Ph.D. Chicago; R. H. Petersen, Ph.D. Columbia; A. J. Sharp (Emeritus), Ph.D. Ohio State; P. L. Walne, Ph.D. Texas.

Associate Professors: C. A. Asmundson, Ph.D. Colorado; S. L. Bell, Ph.D. Chicago; M. W. Bamber, Ph.D. Texas; J. D. Caponetti, Ph.D. Harvard; A. M. Evans, Ph.D. Michigan; A. S. Heilman, Ph.D. Ohio State; H. H. Shugart, Ph.D. Georgia.


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

General degree requirements are given on page 19, and special departmental requirements include successful completion of:

THE MASTER'S PROGRAM

1. Satisfactory preparation of a written formulation and an oral defense to the student's committee of a research proposal suitable for a thesis problem. Must be completed before enrollment in Botany 5000.
2. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030 (can also be applied to the doctoral program).
3. Satisfactory completion of 2 credit hours at the 6000 level.
5. Presentation of a 30-minute departmental seminar.
6. Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

THE DOCTORAL PROGRAM

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

Requirements should be interpreted as minimal, and additional specific stipulations or requirements such as additional foreign languages, additional oral preliminary examinations may be required by the individual student's faculty committee.

**3010-20 Plants in Evolution (4, 4) Monera to angiospermae; emphasis on evolutionary relationships, morphology and development. Prereq: 6 hrs in biological sciences.

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

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

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

**3070 Genetics and Society (3) An introduction to genetics, anthropology, and evolution with emphasis on the role of genetics in human society. (Same as Anthropology 3070)

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

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

**3210 Introductory Plant Physiology (4) Mineral nutrition, water relations, translocation, respiration, photosynthesis, growth phenomena. Prereq: General Chemistry, 3 hrs and 1 lab.

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


4240 Paleobotany (4) (Same as Geology 4240). Review of plant evolution and classification, and phylogeny of the tribes of grasses. Prereq: 3030 or consent of instructor. 2 hrs and 2 labs.

5022 Lichenology (4) Taxonomy, physiology, economics and symbiosis of lichens with an emphasis on field studies and current research. Prereq: 3010, 3011 or 5017, and 5061 recommended. 3 hrs and 3 labs.

5061 Physiology (4) An intensive, comparative study of the major divisions of algae, both freshwater and marine, including taxonomic, ecological, morphological, developmental and phylogenetic aspects. Field and laboratory studies. Prereq: 3030 or equivalent. 2 hrs and 2 labs.

5065 Phytoplankton Ecology (4) The interaction between the environment and phytoplankton. Special emphasis on nutrient uptake, primary production, competition, ecological theory as applied to phytoplankton, and the role of phytoplankton in the environment. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs.

5080 Meteorology (4) Evolutionary study of the lower vascular plants, including morphology, cytology, ecology, life cycles and classification. Biostatistical studies and recognition of local species. Prereq: 3030-30 or consent of instructor. 2 hrs and 2 labs or field trips.

5090 Morphology and Evolution of Basidiomycetes (4) Discussion of structure and function of somatic and sexual life cycles as they apply to evolution in the group. Examination of cultures and specimens in laboratory complements discussion material. Prereq: Botany 3010 or equivalent.

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

5150 Advanced Morphology of Flowering Plants (4) A consideration of vegetative and reproductive organs and their relationship to general morphology, floral development, pollination mechanisms, embryology and its deviations, seed and fruit development. Prereq: 3030-30 or 4120; 3210 or consent of instructor.

**5160 Biosystematics (4) A study of the major experimental methods being used today in systematics and their application to specific types of systematic problems. Cytotaxonomy, numerical taxonomy and chemotaxonomy will be emphasized. Prereq: Consent of Instructor.


**5220 Advanced Plant Physiology II (3) Growth and differentiation of plants at the molecular, cellular, and organismic levels. Chemical regulation of development: macromolecular interpretations of differentiation; photoperiodism and endogenous rhythms; dormancy; germination; flowering and senescence. Prereq: 5210 or Biochemistry 4120 and a plant or cell physiology course.
5910-20 Developmental Plant Morphology (3, 1) Developmental morphology of plants from the aspect of the phenomena of morphogenetic correlations, polarity, symmetry, differentiation, regeneration, tissue mixtures, abnormal growth, environmental and genetic factors. Prereq: 3010-20 or 4120, and 3210 or 5210 for 5910; 5910: 2 hrs and 1 lab for 5910; 1 lab for 5920.

6000 Doctoral Research and Dissertation

6010 Advanced Topics in Morphology of Vascular Plants (2-4) Needs of the student determine content. Topics will be selected from the broad categories of experimental anatomy, morphology, developmental morphology, and cytology. Prereq: 5020-30, 4120, 5910-20 or consent of instructor. May be repeated with consent.

6020 Advanced Topics in Cryptogamic Botany (2-4) Advanced studies and current research in experimental phycology, mycology, bryology, pteridology, or developmental morphology of cryptogams. May be repeated with consent of the department.

6120 Photobiology (3) The interaction of non-ionizing radiation with living systems. Prereq: Elements of Physics or equivalent; Biochemistry 4110.

6130 Advanced Topics in Cytology and Cell Biology (2-4) Requirements and interests of the students would determine topics, such as actions of chemicals on actively dividing cells, current ultramicroscopic research on cell organelles and cellular systems, experimental cytology, cytological control of nuclear acid biosynthesis. Prereq: 5760, Zoology 4310; General Genetics; Biochemistry 4110-20. May be repeated with consent.

6220 Ecosystems of the World (3) Classification and characterization of the world's regional ecosystems; interrelations of climate, topography, soils, vegetation, and fauna. Prereq: 5340.

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

6620 Seminar in the History of Botany (2)

6630-40 Radiation Ecology (2, 2) Use of radiotopes for delineation of food chains, and estimation of energy flow and other ecological processes. Relations of ionizing radiation and other stresses on populations and communities and their microorganisms. Field study of biocenological cycles and dosimetry of isotopes released to air, land, and waters. Coreq: 6 hrs of ecology or Chemistry 3810 or Physics 4710.

6820 Advanced Topics in Plant Physiology (2-4) Requirements of the student determine content, including such topics as growth and hormonal elements; minor element nutrition; photoperiodism; radiation effects. Prereq: 5210; one year of college physics. May be repeated with consent of the department.

6830 Advanced Topics in Ecology (2-4) Needs of the student determine the content, including such topics as: community analysis; biogeochemistry; biocenology and paleoecology; radiation ecology; and system ecology. Prereq: 4310, 5340, 5350. May be repeated with consent of the department.

6890 Advanced Topics in Systematic Botany (2-4) Needs of the student determine the content, with such possible subjects as: morphology and evolution of vascular plants; biocenology and paleoecology; radiational radiation and system ecology. Prereq: 4310, 5340, 5350. May be repeated with consent of the department.

MAJOR

DEGREES

Chemistry

Major: M.S., M.A.T., Ph.D.

Professors: D. A. Shirley (Head), Ph.D., Iowa State; W. A. Skene, Ph.D., University of Illinois; C. J. Collins, Ph.D., North Carolina State; J. D. Dean, Ph.D., Michigan; J. F. Eastham, Ph.D., California (Berkeley); W. H. Fletcher, Ph.D., Johns Hopkins; C. W. Keenan, Ph.D., Texas; H. P. Krentz, Ph.D., Princeton; H. U. Litztke, Ph.D., Wisconsin; G. Mamantov, Ph.D., Louisiana State; A. D. Melaven (Emeritus), Ph.D., Pennsylvania State; G. Schwartz, Ph.D., Illinois State; G. S. Smith, Ph.D., Virginia; H. S. Smith (Emeritus), Ph.D.; Harvard; W. T. Smith (Emeritus), Ph.D., Ohio State; W. A. Van Hook, Ph.D., Johns Hopkins; E. L. Weeker, Ph.D., Purdue; T. B. Williams, Ph.D., London; J. H. Wood (Emeritus), Ph.D., North Carolina State.

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

For students minoring in Chemistry, the prerequisite is two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

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 (6000).
2. Chemistry 4160-70 and two of the following: 5110, 5211, 5311.
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, 5250-59-60-69-70-79, 5340-50, 5410-20-30, 5710-20-30.
4. Participation in seminar (5911-21-31) during the third 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 program leading to the M.S. degree with specialization in polymer science is conducted jointly with the Department of Chemical and Metallurgical Engineering, which offers a degree with similar specialization. This specialization requires satisfactory completion of:

1. Alumni Distinguished Service Professor.
1. Research and thesis to give 9 to 18 hours of graduate credit (5000).
2. Chemistry 4160-70, 5531, 5140-50, Polymer Engineering 4910.
3. Sufficient additional graduate course work in chemistry and/or related fields to make an overall total of 45 hours.
4. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
5. A final oral examination.

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

1. Research and a thesis on an environment or energy-related problem to give 9 to 18 hours of graduate credit.
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate course work in chemistry and/or related fields to give a total of 45 hours. For emphasis in environment, these additional courses must include Chemistry 5250-59-60-69-70-79, Ecology 5310, and Environmental Engineering 3000. For emphasis in energy, these additional courses must include Chemistry 5410, a chemistry sequence (Chemistry 5110-20-30-35 or 5250-59-60-69-70-79 or 5420 or 5710-20-30-5810), Geology 5810, and Mechanical Engineering 4140. 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 nine hours of graduate credit (5000).
3. Sufficient additional graduate course work in chemistry and/or a related field to make an overall total of 60 hours. The additional hours must include two of the following sequences: 5110-20-29-30, 5250-59-60-69-70-79, 5420-30 or 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 course work including 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
5. A comprehensive advanced examination in the field of specialization.
6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
7. A final oral examination.

Satisfactory completion of the following is required:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70 and one of the following: 5511, 5521, 5531.
3. An examination on the basic principles of mechanics, electricity, and magnetism.
5. The requirements listed in items 3, 5, 6, and 7 above.

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

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).
2. Chemistry 4160-70, 5531, 5140-50, 5160 or 5170, Chemical Engineering 4910.
3. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
4. Thirty hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
5. A comprehensive advanced examination in polymer science.
6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
7. A final oral examination.

*3211-21-31 Organic Chemistry (3, 3, 3) The compounds of carbon and their reactions, reaction mechanisms, kinetic and other physical properties. Must be taken in sequence. Prereq: General Chemistry. The corresponding course (3219-21-21) is a coreq for students not having credit for the laboratory.

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


*3429-39 Physical Chemistry Laboratory (1, 1) Gases, liquids, chemical equilibria, solutions, phase equilibria, reaction kinetics and electrochemistry. The corresponding lecture (3429-33-33) is a coreq for students not having credit for the lecture.

*3511-21-31 Principles of Organic Chemistry (3, 3, 3) Structure and reactivity of aliphatic and aromatic compounds emphasizing reactions of synthetic utility. Use of spectroscopic and physical techniques to elucidate reaction
mechanisms. Recommended for chemistry majors or biological sciences. Must be taken in sequence. Prereq: General Chemistry. Corresponding lecture (5290-70-90, 5291) to be attended. Coreq: 5350-39 as a coreq. The latter is recommended.

3529-30 Organic Chemistry Laboratory (1, 1) Experiments on topics discussed in 3221-31. Similar to 3229-39 except designed for students who have need for operating knowledge of various spectroscopic and chromatographic techniques. Corresponding lecture (3221-31) is a corequisite for students not having credit for the lecture.

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


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

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

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

4219 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4210. Coreq: 4220.

4220 Advanced Analytical Chemistry (3) Electroanalytical methods of analyses (including polarography, coulometry, potentiometry, and voltammetry); instrumental methods; mass spectrometry; x-ray absorption and fluorescence techniques. Prereq: Analytical chemistry. Recommended: 5420 or 4920.

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

4420 Physical Inorganic Chemistry (3) The fundamental theoretical concepts leading to an understanding of inorganic chemistry; the quantum theory of the atom, principles of molecular structure, and elementary nuclear chemistry. Prereq: 4410-20-30, 4110.

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

4510 Organic Qualitative Analysis (3) Identification of pure organic compounds and mixtures. Prereq: 3211-21-31, 3219-29-39 or 3519, 3529-39. 3 labs. Not open to students who have completed 4610.


4610-20 Advanced Chemical Experimentation (2, 2) Laboratory course in application of modern experimental techniques to solution of chemical problems. Synthesis and characterization of organic and inorganic compounds with emphasis on independent study using advanced techniques. Prereq: 3521-39 or 3531-39, 3430-39, 4250-39. Not open to students who have completed 4510.

4640 Electronics for Chemists (4) Electronics in design and construction of chemical instrumentation. Prereq: 1 yr of physics.

4910-20-30 Biophysical Chemistry (3, 3, 3) Physical-chemical principles with application to biological systems. Emphasis on sequence. Not open to students having 4910-20-30, 4910—Gas laws; first, second and third laws of thermodynamics; equilibrium. 4920—Solution chemistry; electrochemistry; kinetics; nuclear chemistry. 4930—Elementary quantum chemistry; optical and magnetic spectroscopy; light scattering; macromolecular properties. Prereq: General chemistry, or equivalent; 1 yr of mathematics.

5000 Thesis


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

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


5170 Physical Chemistry of Polymers (3) Rubber elasticity; solution properties of macromolecules; structural, configurational, and conformational aspects. Prereq: 5130.

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

5250-60-70 Advanced Analytical Chemistry (3, 3, 3) 5250—Absorption and emission spectroscopy, structure elucidation by IR, NMR, UV, and mass spectra; 5260—Chemical separation methods: solvent extraction, chromatography, electrophoresis, radiochemical methods; fluorescence; x-ray methods; 5270—Electron-photographic, magnetic and thermal analytical methods; computerized analysis. Prereq: 1 yr of physical chemistry.

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

5280-90 Clinical Chemistry (3, 2) Introduction to clinical chemistry with emphasis on significance of physiologic parameters, electrolytic balance, metabolic functions, analytical methodology, data processing, and problem areas. Prereq: Biochemistry 4110; 1 yr of instrumental and separation methods of analysis. Coreq: Biochemistry Laboratory (1) Techniques of handling physiologic samples, analytical methods and special problem areas. Prereq or coreq: 5260.

5310-20-30 Research in Chemistry (3, 3, 3) Supervised research. Not for credit, (Not applicable to formal course requirements)

5340 Quantum Chemistry (3) Postulate approach to the fundamental principles of quantum mechanics. Accurate solutions to the Schrödinger equation for certain simple systems. Orbital molecular orbitals; calculation of molecular properties.

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

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

5440 Experimental Methods of Infrared and Raman Spectroscopy (3) (Same as Physics 5440.)


5460 Radiation Chemistry (3) Interaction of high-energy radiation with matter with emphasis on radiolytic and radiation chemical units; stopping phenomena; loss spectra; secondary processes and transient intermediates; diffusion models in the radiation chemistry of water and aqueous solutions; gas-phase radiolysis; liquid organic compounds; solid state studies. Prereq: 5460 or Physics 4610, 4720-30. (Same as Physics 5460.)

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

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

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

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

5810 Nuclear Chemistry (3) Nuclear properties, decay, radioactive decay, nuclear reactions, radiation and matter, radiation detection. Prereq: 1 yr of physical chemistry.

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

6000 Doctoral Research and Dissertation

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

6130 Natural Product Chemistry (3) The structure and synthesis of naturally occurring substances of biological or environmental significance. The course content may vary with each offering and will reflect areas of current chemical interest. Prereq: Two of 5110-20-30-35.


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

6175 Organic Photochemistry (3) The physical and chemical effects of electron excitation of organic molecules. Experimental and theoretical techniques of photochemical importance. Inter- and intramolecular reactions of alkenes, ketones, dienes, dienones, aromatic compounds, and other photoactive species. Prereq: Two of 5110-20-30-35.

6190 Organometallic Chemistry (3) The structure, bonding and synthesis of organometallic reagents. Applications 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 optics, introductory nonlinear optics, and spectroscopic techniques for remote sensing. Prereq: 5260.

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance. Recent topics: environmental chemistry, spectroelectrochemistry, modern liquid chromatography, new electronic analytical methods, bioanalytical methods, and microcomputer inorganic processes. Applications in chemical instrumentation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6311 Selected Topics in Polymer Chemistry (3) Subject matter varies among important topics of current significance. Recent topics: polymerization and synthesis of naturally-occurring monomers. Prereq: 5140 and two of 5110-20-30-35.

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

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Any two of 5410-20-30-50, 5240-50. May be repeated.

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

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes pursuant to the excitation of molecules by light and ionizing radiation, multiphoton processes and uses of laser sources; fluorescence and pharmacodynamics. Chemical reactivity of excited states; ion-molecule and free radical reactions; electron capture and electron-transfer processes. Prereq: 5430.

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

6475 Electronic Structure of Radicals (3) Applications of electron spin resonance to the study of molecular conformation, structure, and bonding in organic and inorganic radicals. Comparison of experimental results with theoretical predictions based on the Walsh rules and on INDO molecular orbital calculations. Prereq: 5340-50 and 5820.

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

6865 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at the molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces, cross-sections, "direct" vs. "complex" modes of reaction, photofragmentation, energy partitioning and transfer, chemiluminescence, and chemical lasers. Prereq: 5430.

6800 Organic Chemistry (3) Theories of the mechanism and stereochemistry of important reactions in organic chemistry. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6810 Selected Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance. Recent topics: photoreaction spectroscopy, transuranium chemistry, organometallic compounds, inorganic solution kinetics and mechanisms, crystal chemistry, nonaqueous chemistry, chemistry of halogens and compounds. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

Classics

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

Associate Professors:
M. L. Henbest, M.A. Arkansas; J. E. Shelton, Ph.D. Vanderbilt.

Assistant Professors:

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

Greek

3910 Plato (3)

3920 Herodotus (3)

3930 Euripides (2)

4020 Aeschylus; Sophocles (3)

4030 Lysias (3)

4040 Aristophanes (3)

4050-50-50 Directed Readings in Greek (3, 3, 3)

5110-20-30 The Greek Epic, Homer (3, 3, 3)

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

Latin

3440 Livy (3)

3450 Pliny and Martial (3)

3460 Elegiac Poets (3)

4120 Horace, Satires and Epistles (3)

4310 Selected Readings From Latin Literature (3)

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

4340 Horace, Odes (3)

4350 Tacitus (3)

4360 Lucretius (2)

4370 Readings in Medieval Latin (3)

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

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

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

GENERAL COURSES

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

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

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

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

3320 Art and Archaeology of Archaic and Classical Greece (3) Survey of development of Greek art and architecture, with attention to city planning. Illustrated lectures.

3330 Art and Archaeology of Hellenistic Greece and Rome (3) Hellenistic Greece, Etruscan, and Roman sculpture, painting, and architecture. Assumed knowledge of Greek and Latin.

3340 Cities of the Greek and Roman World (4) Archaeological survey of Greek and Roman cities from 3000 B.C. to 500 A.D. with emphasis on development of city planning and quality of life. Such cities as Mycenae, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied.

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

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

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

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

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

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

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

Comparative Literature

H. C. Rutledge, Chairperson

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

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

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

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

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

Computer Science

MAJOR

Computer Science

DEGREE

M.S.

Professors:

R. T. Gregory (Head), Ph.D., Illinois;
F. Donatson, Ph.D., Texas;
R. J. Piemmons, Ph.D., Auburn (Mathematics);
R. G. Sherman, Ph.D., Purdue (Director of Computing Center).

Associate Professors:

R. M. Alken, Ph.D., Northwestern;
T. Feagin, Ph.D., Texas (Aerospace Engineering);
R. C. Gonzalez, Ph.D., Florida (Electrical Engineering);
E. L. Hall, Ph.D., Missouri (Electrical Engineering);
G. E. Hughes, Ph.D., Pennsylvania State;
S. M. Selkow, Ph.D., Pennsylvania.

Assistant Professors:

A. M. Davis, Ph.D., Illinois;
W. S. Havens,
Ph.D., British Columbia;
C. P. Huang, Ph.D., SUNY (Buffalo);
S. R. Jordan, Ph.D., Wisconsin;
J. M. Maskell, Ph.D., Ohio State;
C. P. Pfeiffer, Ph.D., Pennsylvania State;
D. W. Straight, Ph.D., Texas;
M. G. Thomason, Ph.D., Duke.

ENTRANCE REQUIREMENTS TO M.S. PROGRAM

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

1. Mathematical maturity at least equivalent to that of a student who has completed the calculus sequence through one year of Multivariable Calculus and Matrix Algebra.

2. Computer Science 3155 or an equivalent introductory numerical algorithms course.

3. A basic statistics and probability course such as Statistics 3450 (statistics for engineering) or Mathematics 3050 or 4550.

4. Computer Science 3715 or an equivalent introductory course in discrete structures and logical foundations of computer science.

5. Computer Science 3510 and 3520 or equivalent courses in advanced FORTRAN programming, machine organization and assembler language programming.

THE MASTER'S PROGRAM

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

1. Computer Science 4550 and 4510
2. Electrical Engineering 5615-25-35
3. One of the three courses Computer Science 4710, Computer Science 4035, or Computer Science 4225

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

Plan A: Thesis Option

1. Complete 36 hours of courses at the 4000 level or above, including at least 18 hours at the 5000 level, exclusive of Electrical Engineering 5615-25-35.

2. Complete at least 9 additional hours of thesis credit, Computer Science 5500.

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

Plan B: Non-Thesis Option

1. Complete 45 hours of courses at the

4000 level or above, including at least 27 hours at the 5000 level, exclusive of Electrical Engineering 5815-25-35.

2. Pass written and oral comprehensive examinations.

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

3150 Introduction to Numerical Algorithms and Programming (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. Introduction to programming in FORTRAN. 3150 and 3155 may not both be taken for credit. Prereq or coreq: Multivariable Calculus and Matrix Algebra. (Same as Mathematics 3150.)

3155 Introduction to Numerical Algorithms (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. 3150 and 3155 may not both be taken for credit. Prereq: Introduction to Computer Science or consent of instructor. Prereq or coreq: Multivariable Calculus and Matrix Algebra. (Same as Mathematics 3155.)


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

3715 Discrete Structures (3) Introduction to discrete structures useful in computer science. Sets, set logic, relations, functions, proof techniques, graph theory, lattices, Boolean algebras. Prereq: Introduction to Computer Science and Multivariable Calculus and Matrix Algebra or equivalent. (Same as Mathematics 3715.)

4035-45 Introduction to Numerical Linear Algebra (3, 3) (Same as Mathematics 4225-35.)

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

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

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

4510 Data Structures and Non-numeric Programming (3) Study of data structures and algorithms for their manipulation. Arrays and orthogonal lists; stacks, queues, rings, doubly-linked lists, trees, dynamic storage allocation;

* UT Space Institute.
organization of files: programming languages for file management, 3520. Prereq or coreq: Knowledge of SNOBOL equivalent to that gained in 3570.

4550 Computer Organization and Programming III (3) Computer organization and advanced programming. Machine language and design of computers, representation of information, microprogramming, software systems, input/output systems, interprocess communication, and microprocessors. Prereq: 3520 or equivalent.

4610 Operating Systems—Concepts and Facilities (3) Detailed examination of a major operating system: memory, processor, device, and file management; multitasking; management of CPU time; and user-level input-output, loaders and relocation, device characteristics, data set organizations, SPOOLing. Prereq: 4510 or equivalent.

4620 Operating Systems—Case Studies (3) Alternatives in operating system design, dynamic relocation, paging, 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.

4660 Compiler Construction (3) Practical experience with the design of compilers, scanning, parsing, semantic processing, code generation, and error detection and correction. Term project will include a complete compiler for a small-block-structured language. Prereq: 4510.


4730 Analysis of Non-numeric Algorithms (3) Study of efficient algorithms for searching (e.g., binary search, tree searches hash coding), sorting (e.g., heap sort, Shell's sort, quick-sort), Algorithms for other non-numeric applications, such as pattern matching, graph path detection, set operations. Precise notions of time and space complexity. Polynomial complete problems. Prereq: 4510.

4750 Interactive Computer Graphics (3) The course includes point plotting, vector generation, interactive graph, animation, two- and three-dimensional transformation, perspective view, hidden line elimination, shading, shadowing and hardware system design. Discussion of use of these techniques in design, problem solving, mapping, architecture, and man-machine interaction. Emphasis in Computer Science, Electrical Engineering or Geography and a knowledge of computer program design and consent of instructor. (Same as Geography 4750.)

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

4830 Digital Image Processing (3) (Same as Electrical Engineering 4830.)

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

4910 Analysis and Management of Computer Installations (3) Analysis and design of computer systems: implementation, justification, personnel in systems: perspective on systems. Prereq: 3520 or equivalent.

4960-90 Special Topics in Computer Science (1-4) Credit determined at registration. Prereq: Recommendation of computer science staff. May be repeated with consent of department. Maximum 9 hrs.

5000 Thesis

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

5010 Computer-assisted Instruction (3) Study of the history and development of CAI systems, emphasizing on-line and off-line failure and runaway major projects as well as investigating future role CAI will assume in education. Research projects involving design of CAI system and a language to implement a CAI course. Prereq: 3510 or consent of instructor.


5210 Artificial Intelligence (3) Study of the simulation of intelligent processes by computer. Techniques of representation, search, and manipulation for various areas: problem solving, game playing, pattern perception, theorems proving, semantic information processing. Computer simulation of AI problems. Prereq: 4510 or consent of instructor. (Same as Electrical Engineering 5590.)

5250 Medical Computing (3) A study of the achievements and problems associated with the application of computer technology to the field of health care. Computer hardware and software computing will be covered, including laboratory data systems, patient monitoring systems, diagnostic assistants, databases, rule-based systems, history taking, and hospital administration systems. Prereq: 4510.

5430 Theory of Compilers (3) Traces development of major components of a compiler using the constructs provided by formal language theory. Recognizers, symbol tables, semantic routines, allocation of storage, code optimization. Prereq: 3715.

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

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

5655-65-75 Numerical Mathematics (3, 3, 3) (Same as Mathematics 5655-65-75.)

5670-80 Advanced Operating Systems (3, 3) Theory and practice of operating systems. System optimization and deadlocks. Analysis of operating systems using mathematical models, simulation, and performance evaluation. Software monitors. Comparison of good heuristic scheduling algorithms with best possible schedules; scheduling as part of an operating system or memory systems. Analysis of page swapping and placement strategies. Prereq: 4810 or equivalent or consent of instructor.


5730 Computability and Computational Complexity (3) Computability and decidability; Turing machines and the halting problem. Register machines. Recursive and recursively enumerable sets; partial and total recursive functions. Time and space bounded computations; Time- and NP problem. Prereq: 4710.

5750 Theory of Formal Languages (3) Phrase-structure languages, their generators and processors. Type 0, 1, 2, and 3 languages; operations on languages and grammars; deterministic context-free languages. Theory of translation. Prereq: 4710.

5810 Information Organization and Retrieval (3) A study of the organization, storage, searching, and retrieval of information as obtained from off-line to modern on-line operations. Information analysis and dictionary construction and operations. Search and matching procedures; retrieval process. Information dissemination systems. Data base retrieval systems. Prereq: 4510 or 4550.


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

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

5970 Independent Study in Computer Science (1-3, 1-3, 1-3) under faculty guidance. 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 Sanskrit and consent of instructor.

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

4531-32-33-34 Advanced Chinese (4, 4, 4, 4) Prereq: Intermediate level competence and consent of instructor. 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: Introduction to Black Studies.

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

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

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

4500 Current Issues and Topics in Black Studies (4-6) Problems, topics and issues in the area of Black Studies. The course content and credit will be determined by the instructor. May be repeated. May be graded S/NC.

4830 Black Women in American Society (4) Historical and contemporary sociopolitical factors in American society as they relate to the Black woman. Afro-American History recommended. Prereq: Consent of Instructor.

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

Cultural Studies

5101 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

5103 Independent Study (1-2) See page 148.
**Linguistics**

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

4020-30 Historical Linguistics, Neogrammarian School, and Growth of Structuralism (3, 3) 4020-30 traces the scientific approach to linguistics from Jacob Grimm and Franz Bopp through the nineteenth century. 4030—Traces the change in linguistic interest brought about by Saussure's 

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

**Economics**

See College of Business Administration.

**English**

**MAJOR DEGREES**

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

Professors:


Associate Professors:


Assistant Professors:

J. A. Armistead, Ph.D. Duke; D. R. Cox, Ph.D. Missouri; R. T. Goode, Ph.D. Texas; D. Goran, Ph.D. University of London; P. G. Gough, Ph.D. Yale; T. J. A. Hefterman, D. Phil. Cambridge; M. A. Lofaro, Ph.D. Maryland; M. P. Richards, Ph.D. Wisconsin.

Visiting Lecturers:

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

Detailed information about the Master's and Doctoral programs may be obtained by writing the Director of Graduate Studies in 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) a thesis and 36 quarter hours of courses in English or 45 quarter hours without a thesis, (2) evidence of proficiency in one foreign language, and (3) a final examination. The courses should include 12 hours at the 6000 level, 12 hours of additional courses at the 5000-6000 level, and 12 hours at the level for graduate credit, including the 3000-4000 level.

Students seeking the Master of Arts without a thesis may substitute 9 hours of 5000-6000-level courses for the thesis, making a total of 45 hours.

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

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

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

b. The completion of French 3020 or German 3020, at The University of Tennessee, with a grade of B or better.

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

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

THE DOCTORAL PROGRAM

The departmental requirement for the Ph.D. degree in English is completion of a minimum of three academic years of resident graduate study. This includes a balanced program of 24-quarter courses (or their equivalent) in English: 12 courses at the 6000 level; 6 additional courses at the 5000-6000 level; and 6 courses for graduate credit at any level, including the 3000-4000. 3 courses must be taken for graduate credit in a subject other than English. Upon recommendation of the department, doctoral candidates may include M.A. thesis credits as part of the required course hours.

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

*1211 Written and Oral English for Foreign Students (6) Rapid review of English grammar structures and pronunciation with intensive oral, aural, and written drill. Required during the first quarter of all foreign students (graduates, undergraduates and transfer students) who are not excused from it on the basis of the English Proficiency Examinations required of every new foreign student.

*1212 Written and Oral English for Foreign Students (6) Emphasis on the more advanced structures of English grammar and on paragraph writing. Required during the first quarter of residence of foreign students who on the English Proficiency Examination demonstrate need for work in English structure, but not at the intensive level of English 1211. Required also of foreign students who complete 1211.

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

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


3150 Melville (3)

3210-20 English Literature and Culture of the Nineteenth Century (3, 3) A survey of the literature dealing with leading movements in politics, science, religion, and the arts. 3210—1800 to 1835. 3220—1835 to 1900.

3411-12-20-30 Modern Drama (3, 3, 3, 3) 3411—Contemporary to 1950. 3412—Contemporary since 1930, 3420—British, 3430—American. (Graduate credit normally limited to students in Speech and Theater.)

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

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

3610 Restoration and Eighteenth-century Poetry (3) Emphasis upon Dryden and Pope.

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

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

3670 The Age of Johnson (3)

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


3721 Introduction to Folklore (3) Essential terms and concepts in modern folklore-folk life studies. Emphasis is given to North American material: folklore, folk songs, myth, legend, proverbs, riddles, superstitions, dance, games, and architecture.

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

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

4010-20 Shakespeare (3, 3) 4010—Early plays, c. 1580-1601, including Henry IV, Twelfth Night, and Hamlet. 4020—Later plays, 1601-1613, with emphasis upon tragedies and dramatic romances.

4050-60-70 American Novel (3, 3, 3) 4050—From earliest settler novels through Brown, Cooper, and Kennedy, and major figures to 1875. 4060—Henry James and Mark Twain through Forster's Howards End. 4070—Early twenties to present.

4140-50 Technical Writing (3, 3) 4140—For students planning careers in the physical, life sciences, engineering, agriculture, and business. The writing of proposals, laboratory and progress reports, abstracts and journal articles. 4150—Writing of scientific feature articles in which data are marshaled and analyzed for their human interest.

4210 Tennyson and His Contemporaries (3)

4220 Browning and Arnold (3)
5110-20-30 Tutorial in English (1, 1, 1) Observation of courses in freshman and sophomore classroom settings; preparation of papers, supervised teaching, weekly conferences or seminars on the teaching of college English. Prereq: Consent of Instructor. Required of MACT candidates. S/NC only.

5150 Old English Prose (3)

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

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

5310 Rhetoric and Composition: Theory and Practice (3) Concentration on stylistics and types of expository writing.

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

5510-20 Readings in Literary Criticism from Plato and Aristotle to the Present Day (3, 3)

5610-20-30 Readings in English Literature of the Nineteenth Century (3, 3, 3)

5710-20-30 Readings in English Literature of the Eighteenth Century (3, 3, 3)

5810-20-30 Readings in English Literature of the Renaissance (3, 3, 3)

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

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

6000 Doctoral Research and Dissertation

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

6150 Old English Poetry (3) Prereq: 4711.

6190 Beowulf (3) Prereq: 5150, 6150.

6170 Studies in Middle English (3)

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

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

6241-42 Studies in Colonial American Literature (3, 3, 3) The Frontiersmen through the Second Continental Congress.

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)

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

6610-20-30 Studies in English Romanticism (3, 3, 3)

6710-20-30 Studies in Eighteenth-century Literature (3, 3, 3)

6810-20-30 Studies in Drama and Theatre (3, 3, 3)

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

French

See Romance Languages

Geography

MAJOR DEGREE

Geography

M.S., Ph.D.

Professors:

S. R. Jumper (Head), Ph.D. Tennessee; E. H. Hammond, Ph.D. California (Berkeley); R. G. Long, Ph.D. Northwestern; T. H. Schmudde, Ph.D. Wisconsin.

Associate Professors:

C. S. Aiken, Ph.D. Georgia; T. L. Bell, Ph.D. Iowa; L. W. Brinkman, Jr., Ph.D. Wisconsin; J. B. Rehder, Ph.D. Louisiana State.

Assistant Professors:

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

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours beyond completion of a sound undergraduate major program. Of these, half must be in courses numbered 5000, 6000, or 7000. In addition to this, and must include Geography 5150-60 and (at each offering during residency) 5100. Thesis and comprehensive examination required.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is open 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. All Ph.D. programs must include Geography 5170 and (at each offering during residency) 5100. Other course requirements will be determined by the student's faculty committee in accordance with specific interests and needs. A normal program contains 75 hours in courses for graduate credit and includes a minimum of 15 hours in the 6000 series. A minimum of 15 hours of graduate credit must be earned. In related fields outside the department, registration in any course in the 6000 series may be repeated for credit with the permission of the department. Competence in one foreign language and pertinent quantitative techniques are required. The language will be French or German unless otherwise approved by the student's faculty committee. Written and oral qualifying examinations are required.


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

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

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

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

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

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

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

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

3800 Geography of South America (4)

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

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

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

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.

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

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

4210 Problems in Geographic Method (4) Examples of problem and approach in geographic analysis and synthesis. Emphasis on characteristic problems of the individual student, areal sampling, generalization, classification, regionalization, and questions of scale.

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.

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

4550 Geography of Soils (4) Soils as physical systems and their relationship to environments. Investigation of specific cases of the role of soil in the management of environmental systems.

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

4630 Geography of Agriculture (4)

4710 Cartography (4) Map construction, reproduction, and practice in map drawing.

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

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

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

5000 Thesis

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

5101 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

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

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

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

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

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

5260 Advanced Cultural Geography (3) Geographic analysis of rural settlement in the Eastern United States, with emphasis upon New England, Tidewater East, and Upland South, and geographic application to Southern Appalachians. Includes field work and final paper. Prereq: 3660 or consent of instructor.

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

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

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

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

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

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

5710 Seminar in Geography (3)

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

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

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

6000 Doctoral Research and Dissertation

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

6230-30 Seminar in Urban Geography (3, 3)

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

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

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

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

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

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

Geological Sciences

MAJOR

DEGREES

Geology

M.S., Ph.D.

Professors:

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

Associate Professors:


Assistant Professors:

D. W. Byerly, Ph.D. Tennessee; F. B. Kellor, M.Phil. Yale; H. McSween, Ph.D. Harvard; W. P. Staub, Ph.D. Iowa State.

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours including at least 18 hours in courses (other than thesis) numbered above 5000. A minimum of 24 hours in geology courses, in addition to thesis, is required. Students who enter without having had an acceptable field camp are required to take Geology 4440, or an equivalent course elsewhere, as part of the above department requirements. One year of general physics is required, if not taken as an undergraduate. Orientation examinations will be given to determine course program, which must be approved by the student's committee.
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 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. Registration in any course in the 6000 series may be repeated for credit with the permission of the department.

2. Preliminary examination will be both written and oral.

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

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

*3160 Introduction to Earth Materials (4)
   Introduction to the study of mineral and rocks. Laboratory includes both hand specimen and analytical methods of identification. Prereq: General Geology I. 2 hrs and 2 labs.

*3180 Mineralogy (4)
   Introduction to crystallography and the study of minerals. Laboratory includes hand specimen, chemical and x-ray methods of identification. Prereq: General Geology I. 3 hrs and 1 lab.

3210-20 Invertebrate Paleontology (4, 4)
   Systematic review of important groups. Prereq: 3210 or consent of instructor. 3 hrs and 1 lab or field period.

3250 Paleobotany (4)
   An introduction to the principles and materials of paleobotany as applied to the interpretation of earth history. Prereq: General Geology II. 3 hrs and 1 lab or field period.

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

*3310 Lithology (4)
   Study of igneous and metamorphic processes and rocks. Laboratory includes hand specimen and microscopic study of important rock types. Prereq: 3180. 2 hrs and 2 labs.

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

*3360 Stratigraphy-Sedimentation (4)
   An introductory study of stratigraphic principles and practices and of sedimentary processes and the interpretation of depositional environments. Prereq: General Geology II and 3180. 3 hrs and 1 lab or field period.

3370 Structural Geology (4)
   Introductory discussions of the origins of folds and changes that have occurred in the earth's crust with emphasis on modern concepts of continental drift and plate tectonics. Prereq: General Geology II.

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

4115 Elementary Applied Geophysics (4)
   Basic principles of electrical, seismic, gravity and magnetic surveying. Prereq: General Geology II and Elements of Physics or Fundamentals of Physics: Waves and Optics. 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: 3310. 3 hrs and 1 lab.

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

4240 Paleobotany (4)
   Survey of fossil record of plants with particular emphasis on comparative morphology and evolutionary trends in major plant groups and processes affecting species and geographic distribution of past flora on earth. Prereq: General Geology II or History of Life on Earth or consent of instructor. 3 hrs and 1 lab. (Same at Botany 4240.)

4310 Geologic Mapping (4)
   Interpretation and methods. Prereq: 12 hrs of geology. 3 hrs and 1 lab or field period.

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. 3 lectures and 1 seminar or lab. Prereq: 10 credits of instruction.

4440 Field Geology (6)
   Five-week field course, first term, summer quarter. Employs entire time of students. A report is required, to be submitted no later than end of fall quarter. Prereq: 3 credits in geology and consent of instructor.

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

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

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

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

4650 Mineral Phase Equilibria (5)
   Principles of phase chemistry and application of phase equilibria studies in rock-forming mineral systems as aid to understanding conditions of formation and modification of rocks. Prereq: 4610 or consent of instructor.

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

5000 Thesis

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

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

5120 Geophysics—Gravity and Magnetic Methods (4)
   Potential methods discussed in depth, introduction to geodesy and paleomagnetism. Prereq: 4115, Differential and Integral Calculus or consent of instructor. Advanced engineering mathematics desirable. 3 hrs and 1 lab.

5130 Geophysics—Seismic Exploration Methods (4)
   Seismic refraction and reflection methods discussed. 3 quarter-term courses in applied geophysics and technology at the University are required, 1 quarter. Prereq: 5101 or equivalent. Recommended: 3310.

5310 Advanced Stratigraphy and Sedimentation (4)
   Integrated field-oriented study of sedimentary processes and the occurrence and behavior of elements in the earth's crust. Prereq: General Chemistry or equivalent. Recommended: 3310.
terial rocks involving analysis of depositional environments, paleocurrents, and paleogeographic settings. Prereq: 3360 or equivalent, 4130, 5510.

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

5350 Selected Topics in Geology (1) Presentation of graduate research topics, topics from current literature, and subjects of general interest. Registration required each quarter except summer for resident full-time graduate students. 5/NC only.

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

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

5470 Plate Tectonics and Orogyny (4) Geophysical models of plate tectonics used to devise models of geosynclines, fold belts, metamorphic and plutonic belts, with respect to current conditions and the same in field. Prereq: 3360 and 4550. 3 lectures and 1 lab.

5520 Igneous Petrology (4) Description, classification and origin of igneous rocks. Laboratory emphasizes thin section study. Prereq: 3370. 2 hrs plus field trip. May be repeated. Maximum 9 hrs.

5530 Metamorphic Petrology (4) A study of the physical and chemical characteristics of the metamorphic environment; its gradational nature with diagenesis on one hand and igneous activity on the other. Laboratory will consist of study of both hand specimens and thin sections and a field trip in the Blue Ridge province. Prereq: 3160 and 4550. 3 lectures and 1 lab.

5540 Terrigenous Clastic Sedimentary Petrology (4) Field and microscopic analysis of terrigenous clastic rock types emphasizing the role of transport and depositional processes in affecting sediment texture and composition. Prereq: 3360 or equivalent, 5516. 3 hrs and 1 lab.

5550 Carbonate Sedimentology (4) Emphasis on environments of deposition of modern and ancient carbonates. Prereq: 4130 or consent of instructor. Recommended: 4550. 3 lectures and 1 lab.

5620 Electron Microprobe and X-Ray Spectrographic Analysis: Theory and Application (4) Theory and application of electron microprobe and x-ray spectrophotometric analysis to chemical analysis with emphasis on the earth sciences. Prereq: 3160 or consent of instructor. Recommended: 4550. 3 lectures and 1 lab.

5630 X-Ray Diffraction: Theory and Application (4) Production and use of x-rays in identifying crystalline substance; methods include powder diffractometer, Gandolfi camera, and single crystal methods. Prereq: 3160 or consent of instructor. 2 hrs and 2 labs.

5640 Clay Mineralogy (4) Origin of the clay minerals; their structures and properties; application of mineralogical techniques in clay mineral studies. Prereq: Mineralogy and 5530 or equivalent. 2 lectures and 2 labs. To be offered on alternate-year basis.

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

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

5710 Advanced Paleontology (4) Fossil Invertebrates.


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

5820-30 Mineral Deposits (4, 4) Origin and distribution of mineral deposits. May be taken separately in any order. Prereq: 4110 or consent of instructor. 3 hrs and 1 lab/field/semester period.

5840 Ore Microscopy (4) Study of ore mineral assemblages by reflected light microscopy. Other techniques such as x-ray diffraction and electron microscope may be used as and when necessary. Prereq: 4110, 4550, and consent of instructor. 2 2-hr labs.

5850 Regional Studies in Economic Geology (3) Literature study and seminars on specific mining districts and deposits, followed by a trip between quarters to deposits and mines in the same field. Prereq: 4110 and consent of instructor. 2 hrs plus field trip. May be repeated. Maximum 9 hrs.

5915 Regional Geomorphology (4) Study of selected geomorphologically-related studies, which have common elements such as history or development, related processes which have produced genetically similar assemblages of landforms. May be repeated with consent of department. (Same as Geography 5915.)

6000 Doctoral Research and Dissertation

6110 Seminar in Stratigraphic Geology (3)

6210 Seminar in Paleontology (3)

6310 Seminar in Structural Geology (3)

6410 Seminar in Mineralogy (3)

6510 Seminar in Petrology (3)

6610 Seminar in Economic Geology (3)

6710 Seminar in Geochemistry (3) Prereq: 4510 or consent of instructor.

6810 Seminar in Geomorphology (3) Prereq: 4510 or consent of instructor.

Germanic and Slavic Languages

MAJORS

GERMAN

MAJOR DEGREES

German Language and Literature


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

THE MASTER'S PROGRAM

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

MASTER OF ARTS IN COLLEGE TEACHING PROGRAM

The M.A.T. 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 plan is to prepare highly qualified college teachers. Students receiving the M.A.T. degree would be well prepared to go on to the Ph.D.

THE DOCTORAL PROGRAM

The student must fulfill the general requirements for the Ph.D. degree set by the Graduate School. The candidate for the Doctoral degree must complete a minimum of 81 quarter hours of course work beyond the Bachelor's degree in addition to 36 hours of doctoral research and dissertation. At least 45 quarter hours of the minimum must be taken in 5000 or 6000 courses. Of these 45 hours, a minimum of 18 hours must be chosen from the seminar program (5200) and the literary or philological seminars (6210-20-30-40-50-60 and 6310-20-30). 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 also pass an examination on major works of world literature. A preliminary comprehensive examination, both written and oral, on German language and literature and the minor field or fields, must be passed before the student may be admitted to candidacy. The student will be examined on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. The candidate will be required to defend 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 work, rather than a compilation of research. The field of study is divided into (1) German literature and (2) German (or Germanic) philology or linguistics. A stu-
dent may concentrate on one or the other. Dissertation and seminar research topics will be those and obedience with the varying preferences and specific interests of the faculty. Detailed programs will be established in each case by the student’s faculty committee.

**German**

3010-20-30 Elements of German for Upper Division and Graduate Students (3, 3, 3) For graduate students preparing for language examinations. No graduate credit allowed.

3210-20-30 German Literature in English Translation (3, 3, 3) No foreign language credit.

3240 Old Norse Literature in English Translation (3-4) Prose readings of sagas of Norwegian kings, Icelandic family sagas, and Vinland sagas, narrating discovery of America around year 1000. Mythological and heroic poems of the Edda. No foreign language credit.

3250 Modern Scandinavian Literature in English Translation (3) Introduction to modern literature of Sweden, Norway, Denmark, and Iceland. Representative readings by such writers as Ibsen, Strindberg, Lagerlöf, Hamsun, Vesaas, Lagerkvist, Bang, Nexo, Laxness, No foreign language credit.

4050 The Faust Legend (3) Survey of development of legend from Faust chappoek to present excluding Goethe’s Faust. No foreign language credit.

4110-20-30 Studies in Classical and Modern Writers (3, 3, 3) Content varies. May be repeated for credit. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30 or courses in English translation) or equivalent.

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.

4160 Studies in German Authors (3) Study of the life and works of a single outstanding German literary figure. Content varies. May be repeated for credit. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30 or courses in English translation).

4170 Theatrical German (1-3) Performance in plays by one or more plays. May be repeated for credit with consent of department. Prereq: Intermediate German or equivalent of instructor.

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

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

4260 Introduction to Historical and Comparative Linguistics (3) Linguistic change, proto-languages. Morphological and phonological change. Cultural, historical, sociological influences upon the development of language. Semantic change, Lexicography. All these topics copiously illustrated by selected examples from Indo-European languages. Prereq: 9 hours of upper division English, or 9 hours of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30), courses in literature in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as French, Russian, and Spanish. 4260.)

4270 Introduction to Germanic Linguistics (3) The phonetics and phonemics of German. German grammar and the German vocabulary from a descriptive point of view. The dialects of Germany. An introduction to the study of the other Germanic languages.

4210-20 History of the German Language (3, 3)

4510-20-30 German Civilization (3, 3, 3) Prereq: Intermediate German or equivalent.

4810-20-30 Advanced Conversation and Composition (3, 3, 3) Prereq: 3010-20-30 or equivalent or consent of department.

5000 Thesis

5101 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

5103 Independent Study (1-12) See page 148.

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

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

5410-20-30 Medieval German Language and Literature (3, 3, 3) 6410—Introduction to Middle High German; 5420-30—Readings in Medieval German Literature.

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

5510 German Humanism and the Reformation (3)

5520 German Baroque Literature (3)

5530 The Enlightenment and the Rococo (3)

5540 German Classicism (3)

5550 Goethe’s Faust (3)

5560 German Romanticism (3)

5570 German Realism and Naturalism (3)

5580 Modern German Literature (1899-1945) (3)

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

5600 German Literary Theory and Criticism (3)

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

5710 Introduction to Old Norse (3) Phonology, morphology and syntax of Old Norse. Representative readings in Old Norse.

5720 Readings in Old Norse Prose (3) Intensive readings of Old Norse prose works. The study of the Icelandic saga as a literary genre.

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

6000 Doctoral Research and Dissertation

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

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

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

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

6310-20 Seminar in German and Germanic Philology (3, 3, 3) May be repeated.

**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 reading 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 of Elementary Russian.


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

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

3260 Russian Folklore in English Translation (3-4)

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

4010 Selected Topics in Russian and East European Studies (3) An interdisciplinary seminar on a selected topic using a 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, Russian literature in English translation, Russian Scientific and Technical Literature) or equivalent. May be repeated.

4210-20-30 Studies in Russian Literary Periods (3, 3, 3) 4210—Russian Romanticism, 4220—Russian Realism, 4230—Russian Modernism. Prereq: 9 hours of 3000 courses (exclusive of 3010-20-30, Russian literature in English translation, Russian Scientific and Technical Literature) or equivalent. May be repeated.

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

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

4270 Introduction to Slavic Linguistics (3)

4210-30 Advanced Studies in Russian Language (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.

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

**Greek**

See Classics

**History**

MAJOR

DEGREES

History

M.A., MACT, Ph.D.
Professors: L. P. Graf (Head), Ph.D. Harvard; G. Brooker, Ph.D. Minnesota; E. V. Chmielewski, Ph.D. Harvard; R. E. Duncan, Ph.D. California (Berkeley); H. Fink (Emeritus), Ph.D. Princeton; A. G. Haas, Ph.D. Chicago; Y. P. Hao, Ph.D. Harvard; R. W. Haskins, Ph.D. California (Berkeley); J. W. Huffman (Emeritus), Ph.D. Chicago; C. O. Jackson, Ph.D. Emory; R. A. Landon, Ph.D. Princeton; M. M. Klein, Ph.D. Columbia; R. C. Marlius, Ph.D. Yale.


Assistant Professors: S. D. Becker, Ph.D. Case-Western Reserve; S. J. Kleinberg, Ph.D. Pittsburgh; R. B. Rice, Ph.D. Harvard.

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 of courses numbered 6300 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 6300 or above. Total hours—45. Plan I and Plan II require evidence of proficiency in one foreign language before the M.A. degree is granted.

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

THE DOCTORAL PROGRAM

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

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

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

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

3. Language Requirements: Candidates shall be required to possess a reading knowledge of one language and such additional language or languages as may be determined by the student's graduate committee. Under normal circumstances students specializing in European history will need two languages. The committee may also specify any other research tools, such as statistics, which it regards as essential for the student's preparation. The foreign language requirements may be satisfied in one of two ways:

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

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

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

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

I. Ancient and Medieval

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

II. Early Modern

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

III. Modern

1. Europe, 1815-1914 (2) European World Since 1814 United States, 1815-present (4) Latin America, 1879-present (5) East Asia, 1641-present (6) Middle East, 1798-present

IV. National, Sectional and Topical


3. Russia, 1600-1800 (9) Russia, 1800-present

9. Colonialism and Imperialism

10. Diplomatic History of the United States

11. Social and Cultural History of the United States

12. The North

13. Frontier and Westward Movement

14. Afro-American

Preliminary examinations will be 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.

3061-71 History of Western Religious Thought and Institutions (4, 4) (Same as Religious Studies 3061-71)

3140-50-60 History of England (3, 3, 3) 3140—Henry VIII through the Revolution of 1688. 3150—1689 through the Reform Bill of 1832. 3160—1832 to the present.

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

3411-12-13 Renaissance and Reformation (3, 3, 3) 3411—The Renaissance. 3412—The Reformation 1517-1555. 3413—The Catholic Reformation and the Wars of Religion. (Same as Religious Studies 3411-12-13)


3445-46 History of France (4, 4) 3445—France to 1875. 3446—France since 1875.

3470-80-90 History of Russia (3, 3, 3) 3470—To 1901. 3480—Nineteenth Century. 3490—Twentieth Century.

3510-20 The American Colonies and the American Revolution (3, 3) 3510—Settlements to 1754. 3520—1754-1789.


3710-20-30 History of Germany (3, 3, 3) 3710—The First Reich to 1713. 3720—Habsburg and Hohenzollern and the Formation of the Second Reich, 1713-1890. 3730—From a Unified to a Divided Germany, 1890 to present.

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

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

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

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

MAJOR DEGREES
Mathematics M.A., M.S., M.M., Ph.D.

Professors:

Associate Professors:

Assistant Professors:
D. F. Anderson, Ph.D. Chicago; W. Brandal, Ph.D. Northwestern; J. D. Chandler, Jr., Ph.D. Virginia; V. A. Dougalls, Ph.D. Harvard; E. L. Evans, Ph.D. Houston; R. H. Hanks, Ph.D. Minnesota; W. F. Keigher, Ph.D. Illinois at Urbana-Champaign; J. E. Leech, Ph.D. California (Los Angeles); R. Lowry, Ph.D. Calif. Inst. Tech; W. H. Row, Ph.D. Wisconsin; R. J. Rowlett, Ph.D. Virginia; S. M. Sarbin, Ph.D. Cornell; R. O. Shelton, Ph.D. Rice; K. R. Stephenson, Ph.D. Wisconsin; J. J. Walsh, Ph.D. Suny; A. T. M. Wang, Ph.D. Minnesota.

Math 3050, 3060, 3090, 3100, 3110, 3120, 3130, 3230, 3240, 3270, 3010-30-30, 3720, and 3910 are intended primarily for students preparing to teach in elementary or secondary schools.

Any 3000 or 4000 course in the department whose course number ends in "0" may be offered as an honors version. In this case, the last digit will appear as an "8" and the title will be preceded by the word "Honors" both in the timetable and on the student's transcript. Honors courses listed in the Graduate Catalog are acceptable for graduate credit. Such courses may be offered upon the initiative of interested faculty, students, or the department head (though in all cases subject to the approval of the department head).

MASTER OF MATHEMATICS PROGRAM

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

Before admission to this program, the applicant must have either (a) certification for teaching secondary mathematics in at least one of the states of the United States, or (b) three years of successful elementary or secondary school teaching experience.

Evidence of the requirement being met must be supplied by the student.

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

The following requirements must be met:
1. Completing 45 hours of course work, of which at least 18 must be at the 5000 level. The course work must include:
   a. 36 hours of mathematics courses numbered 3050 or above,
   b. 9 hours of additional work from mathematics courses numbered 3050 or above or from courses in other departments selected in consultation with the advisor.
2. Passing a comprehensive examination upon completion of all course work.

THE MASTER'S PROGRAMS

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

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

After two quarters of graduate study, a student whose supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 4000 are required. Of these, 27 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the 45 hours, 15 in courses approved by the supervisory committee may be taken in fields other than mathematics. For this option it is also required that a written comprehensive examination be passed, and that credit be received for a 3-hour seminar or reading course (5980-5995) in which a term paper of 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 of the following subjects to the extent indicated by the accompanying course numbers and such other topics as the graduate faculty may prescribe:
   a. Algebra 5510-20-30
   Functions of a Complex Variable 5110-20-30
   Functions of a Real Variable 5210-20-30
   Topology 5910-20-30

- Space Institute, Tullahoma.
b. Linear Analysis 5240-50-60
Mathematical Statistics 5750-60-70
Numerical Mathematics 5655-65-75
Partial Differential Equations 5450-60-70
The student must pass at least two examinations from Group a.; anyone passing two examinations from Group b. will be required to take an approved one-year graduate course (numbered 5000 or above), in which mathematics is extensively used, outside of the Mathematics Department, and not cross-listed as courses.
2. Pass an intensive examination in the student's area of specialization.
3. Demonstrate a reading knowledge of two of the following languages: French, German, Russian or an approved alternative. At least one language requirement must be met before taking a written exam in the student's third year, the second language requirement must be passed in the exam in the student's area of specialization.
4. Complete an approved one-year 6000-level course in mathematics outside the area of specialization.
5. Complete a dissertation consisting of original and significant research.
6. Pass a final oral examination.
Study in a cognate field is not required by the Mathematics Department.
Registration in any course in the 6000 series may be repeated for credit with the permission of the department.

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

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

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

*3100 Logic and Sets (3) Elements of mathematical logic; truth sets and open sentences; diagrams for truth sets; elementary algebra of sets with operations of union and intersection. Prereq: 1 yr of college mathematics. Primarily for students in the College of Education.

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

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

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

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

3310 Advanced Euclidean Geometry (3) Triangles and circles and coordinates in modern concepts. Prereq: 1 yr of college math.

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

3330 Transformational Geometry (3) Fundamental transition from plane to solid geometry. Classification of isometries and similarities; symmetries of a polygon; inversions. Prereq: 1 yr of college mathematics.

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: Calculus of Algebraic Functions, Linear Algebra and Calculus or Single Variable Calculus.

4035-45 Introduction to Numerical Linear Algebra (3) Matrix Algebra and Applications (3) Matrices, elementary operations, systems of linear equations, determinants, eigenvalues and eigenvectors. Prereq: Multivariable Calculus and Matrix Algebra or Calculus or consent of instructor.

4050 Matrix Algebra and Applications (3) Matrices, elementary operations, systems of linear equations, determinants, eigenvalues and eigenvectors. Prereq: Multivariable Calculus and Matrix Algebra or Calculus or consent of instructor.

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 canonical form, and related topics. Prereq: Multivariable Calculus and Matrix Algebra or 4050.

4120 Linear Algebra (3) Abstract vector spaces, linear transformations, quadratic forms, eigenvalues and eigenvectors, systems of linear equations and determinants, inner products, and diagonalization of symmetric matrices. Prereq: Multivariable Calculus and Matrix Algebra or Calculus or consent of instructor.

4150-60 Abstract Algebra (3, 3) Equivalence relations and partitions, properties of integers, elementary theory of groups of rings, polynomial rings, integral domains, division rings, unique factorization domains, fields. Must be taken in sequence. Prereq: Multivariable Calculus and Matrix Algebra or 4050.

4225-35 Introduction to Numerical Analysis (3, 3) Interpolation and approximation, numerical differentiation and integration, root finding of functions, systems of linear and nonlinear equations, least squares, eigenvalues, singular value decomposition. Prereq: 3155. (Same as Computer Science 4225-35.)

4230 Intermediate Numerical Methods (3) Numerical methods in differential and algebraic equations; linear computations and other topics in numerical analysis, with emphasis on applications of computers. Must be taken in sequence. Prereq: 3150 or 3155.

4250 Elementary Complex Variables (3) Complex numbers, Cauchy-Riemann equations, elementary functions, Cauchy's theorem, prime number formula, Taylor and Laurent series, residues and their applications. Prereq: Multivariable Calculus and Matrix Algebra or Multivariable Calculus and Matrix Algebra. Prereq: 4000-level mathematics course recommended.

4510-20-30 Introduction to Analysis (3, 3, 3) Real number system, functions, sequences, limits, continuity, uniform continuity, differentiation, integration, integration of several variables, implicit function theory. Multiple integrals, infinite series, sequences and series of functions, uniform convergence. Taylor series. Should be taken in sequence. Prereq: Multivariable Calculus and Matrix Algebra.

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: Multivariable Calculus and Matrix Algebra.

4550 Partial Differential Equations (3) Fourier series; Fourier integrals; orthogonal functions; the vibrating string; solution by series; separation of variables, explicit formulas. Prereq: Multivariable Calculus and Matrix Algebra or Multivariable Calculus and Matrix Algebra. Prereq: 4000-level mathematics course recommended.

4590-60-70 Ordinary Differential Equations (3, 3, 3) Linear first-order and second-order differential equations. Power series solutions and Legendre polynomials. Regular singular points, Frobenius method, and Bessel equations. Systems of linear differential equations and the matrix exponential. 4620—Numerical methods for ordinary differential equations, including the multistep methods. 4630—Numerical methods for ordinary differential equations, including the multistep methods. 4640—Special topics which may include existence and uniqueness, oscillation theory, Laplace transform, stability, singular perturbations, and asymptotic solutions. Prereq: 4610: Multivariable Calculus and Matrix Algebra or 4050; 4620: 4630 or Multivariable Calculus and Matrix Algebra or 4050 or 3150; 4650: 4610 or consent of instructor.

4640 Calculus of Finite Differences (3) Real difference equations; interpolation, numerical integration, extrapolation, multistep methods, the vibrating string, the method of characteristics, numerical solutions of partial differential equations. Prereq or coreq: 4610.

4650-60-70 Introduction to Mathematical Statistics (3, 3, 3) Introduction to probability; discrete and continuous distributions; correlation, regression, and statistical independence; foundations of sampling theory; significance tests.
and continuity, partial derivatives, directional derivatives and gradient, implicit function theorem, maxima and minima, transformations. Prereq: Intermediate Analysis or consent of instructor.

**5015 Probability and Statistical Inference for Teachers (3-4)** Probability distributions including binomial, Poisson, normal, hypergeometric, and normal distributions. Expectation, variance, characteristic functions of continuous random variables; moment generating functions; applications of special probability distributions including the Chi-square, F, and t distributions; intervals estimation of means and variances; simple hypothesis testing. Prereq: 1 yr of calculus and 3050 or consent of instructor.

5050-50-70 Mathematical Logic (3, 3, 3) Truth functions; the syntax and semantics of some propositional theories; Gentzen’s sequence-calculus and systems of natural deduction; algebraic logic; the syntax and semantics of first order theories; elementary model and recursion theory; consistency, completeness, decidability.

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

5150 Foundations of Analysis (3) Development of the real number system; basic properties of the integral, rational, real, and complex numbers; completeness axioms of the real numbers; algebraic and transcendental functions; complex exponents and logarithms; analytic continuation; the Weierstrass E-functional; infinite series; Taylor’s and Maclaurin’s theorems, generalized reciprocals, Hadamard inequalities; hybrid elements. Prereq: Intermediate Analysis or consent of instructor.


5340-50-60 The Numerical Treatment of Algebraic and Transcendental Equations (3, 3) The mathematical principles underlying such methods as those of Gauss, Newton, Bernoulli, Graeffe, and others for obtaining numerical solutions; theorems of Budan and Fourier, Sturm, Rouché and Hurwitz, and others for localizing roots.


5440 Calculus of Variations (3) Functions of several variables, existence of extremals, necessary conditions for an extremum—Euler’s equation. Variational problems with constraints; integral functionals depending on higher-order derivatives. Broken extremals—the Weierstrass-Erdmann conditions. Optimization of functional, extremals for a function, field of extremals for a functional. The solution of a functional, Legendre’s condition, conjugate points, Jacobi’s condition, sufficient conditions for a weak extremum. Prereq: 5170, 5150, 5110, 5120. Must be taken in sequence.

5450-60-70 Introduction to Partial Differential Equations (3, 3, 3) Linear second-order partial differential equations in two variables; properties of elliptic, hyperbolic and parabolic equations, separation of variables, and Fourier series, nonhomogeneous problems, problems in higher dimensions, multiple Fourier series, Fourier and Laplace transforms. Prereq: 4510-20-30 and 4610 or consent of instructor.

5455 Finite Difference Methods for Partial Differential Equations (3) Finite difference techniques for the solution of parabolic, elliptic, and hyperbolic differential equations: Computational stability, consistency, stability, consistency and convergence; nonlinear problems; curve boundaries; solution of linear systems. Prereq: 3150 or 3155 and 4550. (Same as Computer Science 5465.)

5485 Mathematical Aspects of the Finite Element Method (3) The variational formulation of the Ritz-Galerkin methods for the solution of ordinary and partial differential equations. Local bases, approximation theory, rates of convergence, eigenvalue and initial value problems, singularities, hybrid elements. Prereq: 3150 or 3155 and 4550. (Same as Computer Science 5465.)

5489-90 Mathematical Programming (3, 3) Optimization of functions of several variables subject to constraints. Prereq: 3150, 4060 and 4550.

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

5515 Methods of Advanced Mathematics (3) Fields and their extensions, separable and nonseparable extensions, algebraic closure, groups of automorphisms, fundamental theorem of algebra, theory of equations, by radicals. Prereq: or coreq: 5520.

5560-70-80 Theory of Matrices in Numerical Analysis (3, 3, 3) Fundamental matrix identities and inequalities: Factorization theorems, generalized reciprocals, Hadamard inequalities, Lanczos reductions. 5570—Vector and matrix norms, convergence, domains of inclusion and exclusion of roots of matrices, the field of values; minimax and maximin theorems for Hermitian matrices; Kantorovic inequalities. 5580—Computational methods for inverting matrices, direct and by successive approximation; methods of reduction to normal form; successive approximations to the roots of matrices; measures of error. Prereq: Consent of instructor.

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

5610-20-30 Mathematical Methods in Physics (3, 3, 3) (Same as Physics 5510-20-30.)

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

5655-65-75 Numerical Mathematics (3, 3, 3) The numerical solution of large systems of linear algebraic equations, systems of nonlinear equations and the algebraic eigenvalue-
eigenvector problem. Prereq: 4045 or 4235. (Same as Computer Science 5655-65-75)


5810-20-30 Number Theory (3, 3, 3) Arithmetic functions, distribution of primes, Diophantine equations, approximation theory, Shintirelman density and Mann's theorem, quadratic forms, Dirichlet's theorem, prime number theorem. Prereq or coreq: 5510 for 5610; 5520 for 5820.

5910-20-30 Elementary Topology (3, 3, 3) Topological spaces; metricization, homeomorphic invariants of point sets; structure of Peano continua. Mapping; homotopy. Introduction to combinatorial topology.

5980 Graduate Reading in Mathematics (1-3) Open to graduate students with permission of the department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

599x Seminar Analysis (1-3)
599x Seminar Algebra (1-3)
599x Seminar Foundations (1-3)
599x Seminar Applied Mathematics (1-3)

6000 Doctoral Research and Dissertation

6210-20-30 Linear Analysis (3, 3, 3) Algebraic and topological properties of linear spaces, emphasis on normed spaces; linear functionals and dual spaces; linear transformations; special topics (spectral theory, ergodic theory, semigroups of transformations); applications to problems in analysis. Prereq: 4150-60 and 5910-20-30. Must be taken in sequence.

6450-60-70 Partial Differential Equations (3, 3, 3) Advanced topics in classical and modern mathematical theory for partial differential equations. Prereq or coreq: 5110-20-30 and 5120-20-30 or consent of instructor.

6510-20-30 Modern Algebra (3, 3, 3) Intensive study of some major branch of algebraic theory. Subject matter will vary according to interests and preparation of students. Prereq: 5510-20-30.

6540-50-60 Theory of Semigroups (3, 3, 3) Congruences and homomorphisms; ideal theory; representations, decompositions, and extensions; free, regular, inverse, simple, and completely simple semigroups. Prereq: 5520.

6570 Theory of Groups (3) Structure of groups, free groups, nilpotency and solvability, extensions and products, permutation groups, abelian groups. Prereq: 5520.

6610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) Theory of ordinary differential equations from an advanced viewpoint. Topics from the current literature. Subject matter varies according to interests and preparation of students. Prereq or coreq: Introduction to Differential Equations 1450-60, and 5110-20-30 or 5120-20-30 or consent of instructor.


6810-20-30 Topological Algebra (3, 3, 3) Topics chosen from topological semigroups, topological groups, Lie groups; transformation groups; topological lattices; relations in topological spaces; topological rings, fields, algebras. Prereq or coreq: 5120-20-30.

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

6940-50-60 Introduction to Algebraic Topology (3, 3, 3) Introduction to homology, cohomology, and homotopy theories. Typical topics discussed will be homology and cohomology groups, the Ehresmann-Steenrod axioms, cup and cap products, duality theorems, homotopy equivalence, higher homotopy groups, fiber spaces, spectral sequences. Prereq: 4160 and 5920.

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

Registration for seminars may be repeated with consent of department.

Microbiology

MAJOR

DEGREES

Microbiology

M.S., Ph.D.

Professors:

A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. O. Mundt, Ph.D. Michigan State; J. M. Woodward, Ph.D. Kansas; C. J. Wust, Ph.D. Indiana.

Associate Professors:

J. M. Becker, Ph.D. Cincinnati;
T. C. Monte, Ph.D. Maryland; W. S. Rigsby, Ph.D. Yale; B. T. Rouse, Ph.D. Guelph (Canada).

Assistant Professors:

D. A. Barnis, Ph.D. Cornell; D. A. Brian, Ph.D., D.V.M. Michigan State; R. V. Miller, Ph.D. Illinois; G. S. Sayler, Ph.D. Idaho.

Lecturers:

H. I. Adler, Ph.D. Cornell; B. B. Bellomy, M.D. Georgetown; W. Farkas, Ph.D. Duke;

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

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

3810 Food Bacteriology (4) Methods for examination, cultivation and identification of bacteria associated with food fermentation and food spoilage. Prereq: General Microbiology and Elements of Organic Chemistry or Chemistry 3211.

3820 Yeast and Molds (4) Morphology, taxonomy, and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: General Microbiology and Elements of Organic Chemistry or Chemistry 3211 or consent of instructor.

4110 Physiology of Bacteria (2) Modern concepts of bacterial physiology and metabolism including cell structures and function. Prereq: Introduction to Microbiology I: Physiology, Genetics and Ecology and 12 hrs of organic chemistry.

4119 Bacterial Physiology Laboratory (2) Prereq: Introduction to Microbiology Laboratory I: Coreq: 4110.

4130 Taxonomy of Bacteria (3) Bacterial classification. Prereq: Introduction to Microbiology I: Physiology, Genetics, and Ecology and laboratory.

4140 Molecular Genetics of Prokaryotes (2) Transmission and expression of genetic information at the molecular level. Emphasis is on bacterial and viral systems, but unique features of eukaryotic genetic systems are included. Prereq: Introduction to Microbiology I: Physiology, Genetics and Ecology; 1 yr of Organic Chemistry; General Ecology or consent of instructor.


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

4279 Advanced Immunology Laboratory (3) Laboratory exercises designed to accompany 4270. Prereq or coreq: 4270.

4320 Pathogenic Bacteriology (2) Disease producing microorganisms including bacteria, rickettsia, and viruses. Prereq: Introduction to Microbiology III: Pathogenic Microbiology.

4329 Pathogenic Bacteriology Laboratory (2) Techniques for isolation, cultivation, and identification of pathogenic bacteria. Prereq: Introduction to Microbiology Laboratory III: Coreq: 4329.

4330 Medical Mycology (2) Disease-causing fungi; cytology, physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq: Introduction to Microbiology III: Pathogenic Microbiology and 3920.

4339 Medical Mycology Laboratory (2) Prereq: Introduction to Microbiology Laboratory I: Coreq: 4330.

4420 Molecular Virology (2) Molecular aspects of the replication, assembly and expression of viruses; with emphasis on bacteriophage. Prereq: Introduction to Microbiology I: Physiology, Genetics, and Ecology.

4430 Medical Virology (3) General Virology with emphasis on medical aspects. Prereq: Introduction to Microbiology III: Pathogenic Microbiology.

4439 Medical Virology Laboratory (2) Laboratory procedures for isolation, handling and culture of animal viruses. Prereq: Introduction to Microbiology Laboratory III: Coreq: 4430.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such
topics in microbiology, concentrated in time.

Molecular and genetic aspects of infection.

Literature surveys and laboratory methods for the development and interpretation of microbiological research.

Selected, advanced topics in microbiological research.

Intrinsically, cultivate and taxonomic relationships of microorganisms, with emphasis upon the less- frequently encountered orders.

Prereq: 4150. 3 lab.

Selected Topics in Microbiological Research

Literature surveys and laboratory methods for the development and interpretation of microbiological research.

May be repeated.

Max. 9 hrs. S/NC only.

Topics in Taxonomy

Isolation, cultivation, and taxonomic relationships of microorganisms, with emphasis upon the less-frequently encountered orders.

Prereq: 4150. 3 labs.

Selected Topics in Microbiological Research

Literature surveys and laboratory methods for the development and interpretation of microbiological research.

May be repeated.

S/NC only.

Topics in Immunology and Immunohemistry

Molecular and genetic aspects of immunoglobulin synthesis. Theoretical and practical exercises in immunohemistry.

Prereqs: 3071, 3072; Biochemistry 4110-20 or equivalent.

Seminar in Microbial Physiology

Readings and discussions based on the current literature. May be repeated. S/NC only.

Seminar in Immunology

Readings and discussions based on the current literature. May be repeated. S/NC only.

Clinical Microbiology

Six quarters, 6 quarter hrs each consisting of lectures and clinical laboratory experience. Enrollment by permission of department head.

Seminar in Filamentous Fungi

Readings and discussions based on the current literature. May be repeated. Maximum 9 hrs. S/NC only.

Research Problems

S/NC only.

Microbial Physiology

Lectures and seminars dealing with current advances in bacterial physiology including growth and cell structure.

Prereq: 4111; Biochemistry 4110-20.

Pathogenesis of Infectious Disease

Host response to infection. Derangement of homeostasis induced by microorganisms, toxins, endotoxins and other factors related to virulence. Alteration of genetic and hormonal controls resulting from progressive infection.

Prereq: 3071.

The Oncogenic Viruses

Lectures and special laboratory exercises dealing with known tumor-inducing viruses.

Prereq: 4521 or consent of instructor. 2 hrs and 1 lab.

The Bacterial Viruses

Lectures and discussions dealing with bacterial viruses with emphasis on the biological and chemical consequences of bacteriophage infection. Text will be supplemented by readings from the literature.

Prereq: 4521; Biochemistry 4110-20.

Molecular Genetics Laboratory

Principles of methods of research in molecular genetics. Fundamental genetics concepts (mutation, complementation, recombination) at the molecular level. Emphasis on studies of the lactose operon of Escherichia coli.

Prereq: 4811 and Biochemistry 4110-20 or consent of instructor.

Microbiology of Foods

Lectures and seminars dealing with current advances and selected topics in food microbiology with emphasis on analytical methods, safety and preservation.

Prereq: 3810; Biochemistry 4110-20. Recommended: Food Technology 4920.

Experimental Microbial Ecology

Survey of techniques for the assessment of microbial forms, functions, activities, and interactions in a variety of habitats.

Prereqs: 3009, Coreq: 4950 or consent of instructor. 1 hr and 2 labs.

Seminar in Microbial Pathogenesis

Readings and discussions based on the current literature. May be repeated. S/NC only.

Seminar in History of Microbiology

Studies concerned with microbiologists and their achievements from Pasteur to the present.

S/NC only.

General Seminar (1, 1, 1, 1, 1, 1)

Readings and discussions of current literature. May be repeated with consent of department. S/N/C only.

Seminar in Microbial Genetics

Readings and discussions of current literature. May be repeated with consent of department. S/N/C only.

Research Problems

May be repeated with consent of department. S/NC only.

Music

MAJOR

DEGREES

Music

M.A., M.M.

Professors:

H. W. Fred (Head), Ph.D. North Carolina;
W. P. Carter, D.M.A., Eastman; G. F. Dwyer, Diploma, Schurz (Chicago); W. Dorma, M.A., Columbia; A. G. Holford, M.M. Northwestern;
C. R. Huber, Ph.D. North Carolina;
J. J. Meacham, M.M. Northwestern;
D. L. Neuen, M.M. Ball State;
J. M. B. Pederson, Ph.D. Iowa;
J. S. Scott, M.M., Eastman;

Associate Professors:

J. Coker, M.A., Sam Houston;
F. M. Combs, M.A. Missouri;
D. Houugh, M.M. Tennessee;
E. Johnson, D.M.A., Stanford;
M. Johnson, M.B. Oberlin;
L. W. Michalopulos, M.A. Columbia;
W. G. Scariot, M.M., Louisiana State;
S. E. Young, Ph.D. North Carolina.

Assistant Professors:

F. Adams, M.M., Tennessee;
P. Horodysky, M.M., Manhattan Sch. of Music;
J. Jacobs, D.M.A. Texas;
J. G. Kosteck, D.M.A. Michigan;
J. Lennon, M.M., Michigan;
K. McClelland, M.A. Columbia;
S. R. Mabry, M.M. Tennessee;
E. E. Nichols, M.M., Cleveland Institute of Music;
D. Northington, M.M., Cincinnati;
G. Teachey, D.M.A. Florida State.

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

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

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

General requirements for the Master's degree begin on page 19 of this catalog.

THE MASTER OF MUSIC PROGRAM

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

 Piano: 45 hours distributed as follows:
   (a) 12 hours in applied music, (b) 9 hours in piano literature and/or pedagogy, (c) 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, (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 accompanying, (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 ensemble, (c) 3 hours in recital, and (d) 12 hours in music electives.

 Wind and Percussion Instruments: 45 hours distributed as follows:
   (a) 12 hours in applied music, (b) 6 hours in ensemble, (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.

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

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

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

Suzuki String Techniques: 45 hours distributed as follows: (a) 72 hours in applied music, (b) 6 hours in Suzuki literature/techniques, (c) 3 hours in music research, (d) 3 hours in music theory, (e) 3 hours in recital, (f) 6 hours in ensemble, and (g) 12 hours in electives.

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

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

Specific courses 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 (3) Melody harmonization, figured bass realization, and improvisation. Prereq: Harmony I, singing and ear training, and keyboard proficiency at the 2000 level.

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

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

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

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

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

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

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

3360 Oratorio (3) Choral works other than those appropriate for use in church.

4001 Organ Design (3) Historical, tonal and mechanical principles of organ design.

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

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

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

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

4111-21-31-41 Analysis of Music Literature (3, 3, 3, 3) Detailed examination of musical compositions by historical period with emphasis on harmony, formal structure, and style. Traditional and contemporary analytical techniques.

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

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

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

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

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

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

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

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

4250 Contemporary Music: 1945 to Present (3) Survey of music from 1945 to present. Emphasis on style and theoretical.

4260 Introduction to Ethnomusicology (3) Basic attitudes and techniques of ethnomusicology. Survey of music cultures of the Pacific, Near East, Asia and Africa.

5001 Choral Conducting Document (3) A reading knowledge of French or German must be demonstrated by candidates for the Master of Arts degree.

5006 Special Topics in Performance (1-3) Prereq: Consent of instructor.

5052 Vocal Chamber Music Performance (3) Practice in vocal chamber music.

5053 Choral Conducting Performance (3) Practice in choral conducting.

5054 Lecture Recital (3) Seminar in choral performance.

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

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

5091 Independent Study in Music Theory (1-3) Prereq: Consent of department head.

5111 History of Music Theory (3) A survey of the work and contributions of theorists from ancient Greece to present. Emphasis on 1800 to present. Prereq: Consent of instructor.
5115 Theory of Computers and Music Research (3) Theory of computer applications in music, emphasizing techniques of analysis and indexing. Prereq: Consent of instructor.

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


5121 Analytical Techniques (3) A survey of analytical techniques with emphasis on contemporary approaches. Prereq: Consent of instructor.

5125 Practicum in Computers and Music Research (3) Programming languages, design and implementation of projects in musical analysis, composition and indexing. Prereq: 5115 or consent of instructor.

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

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

5210 Introduction to Music Research (3)

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

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

5315 Band Literature (3) A study of band literature and the origins of the band emphasizing its important, expanded cultivation during the post-World War II period. Prereq: Consent of instructor.

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) Survey of music from 1400 to 1600. Mass, motet, chanson, madrigal, and other vocal and instrumental forms and genre.

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

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

5400 Musical Aesthetics (3) An examination of the nature of music and the musical experience, sense perception and the emotions, value in music, and the role of the artist in society. The aesthetic viewpoint of individuals and historical eras will be explored 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)

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

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

5600 Small Ensemble (1)

5602 Brass Choir (1)

5604 Jazz Ensemble (1)

5606 Trombone Choir (1)

5607 Tuba Ensemble (1)

5610 Percussion Ensemble (1)

5612 Baroque Ensemble (1)

5620 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 Varisty Band (1)

5656 Laboratory Band (1)

5657 Marching Band (1)

5670 Symphony Orchestra (1)

5680 Concert Choir (1)

5682 University Chorus (1)

5694 Campus Chorus (1)

5696 Men's Glee Club (1)

5697 Women's Chorale (1)

5699 Accompanying (1)

* May be repeated.
** May be repeated. Maximum 6 hrs.

Philosophy

MAJOR DEGREES

Philosophy

M.A., Ph.D.

Professors:

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

Assocate Professors:

R. E. Aquila, Ph.D. Northwestern; L. B. Cebik,
Ph.D. Nebraska; G. C. Graber, Ph.D. Michigan.

Assistant Professors:

J. O. Bennett, Ph.D. Tulane; G. G. Brankorst,
Ph.D. Michigan; S. H. Cohen, Ph.D. Northwestern;
K. A. Emmett, Ph.D. Ohio State;
H. P. Hamlin, Ph.D. Georgia; R. James, Ph.D. Chicago;
B. C. Latta, Ph.D. Yale; S. Reaven,
Ph.D. California (Berkeley).

THE MASTER'S PROGRAM

See general requirements on page 19. Courses below 4000 may not be taken for graduate credit by philosophy majors except with special permission.

THE DOCTORAL PROGRAM

Specific requirements for doctoral students in Philosophy include a minimum of 36 quarter hours credit involving at least 72 quarter hours credit in course work (normally 24 quarter courses or their equivalent, exclusive of credit for the thesis and dissertation) of which not less than 45 shall be in courses numbered over 5000, and of which at least 9 shall be in a subject other than philosophy. The specific number and distribution of courses will be determined by the student's faculty committee.

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

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

MEDICAL ETHICS

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

RELIGIOUS STUDIES

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

3111 Ancient Western Philosophy (4)

3121 Medieval Philosophy (4)

3131 Seventeenth- and Eighteenth-century Philosophy (4)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5000 Thesis

5050 Symbolic Logic (4)

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

5110-20-30-40-45-60 Studies in the History of European Philosophy (4, 4, 4) Intensive critical work on a major philosopher or a school. 5110—Greek. 5120—Hellenistic or Medieval. 5130—Modern, before Kant. 5140—Kant. 5150—Nineteenth Century. 5160—Twentieth Century.

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


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

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

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

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

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


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

5610 Recent Developments in Philosophy of Religion (4)

5710 Studies in Metaphysics (4) Metaphysics of a philosopher or systematic philosophical traditions.
A student who enrolls in the Graduate School with the intention of attaining an advanced degree in physics, or its equivalent. Physics 3210-20, 3710-20-30 or 4110-20-30. 5210-20, 4230 or 4240 constitute the minimum course prerequisite to graduate study.

A student who intends to present Physics as a graduate minor shall, in general, have completed an undergraduate minor in physics or its equivalent. Physics 3210-20, 4210-20. 4210-30 constitute the minimum course work prerequisite to graduate study.

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

Departmental graduate programs providing special opportunities for academic and research work in areas pertinent to atmospheric and space flight are available at the Space Institute, Tullahoma.

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

THE MASTER'S PROGRAM

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

The thesis program is primarily designed for students intending to go into industrial or governmental laboratories or as physicists. The course requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 5110-20-30, 5210-20-30, 5310-20-30, 5610-20-30 and appropriate courses in related fields. Each candidate must satisfy entrance examination, pass an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

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

The Physics Department is also particu-
4510-20-30 Atomic Physics Laboratory (3, 3, 3) Experiments in fundamental particle properties, photoelectricity, conduction of electricity through gases at low pressures, and molecules, atoms, and ions, spectroscopy, x-ray. Prereq: 4630 and 5210.

4540-50 Experimental Nuclear and Radiation Physics (4, 4) Interaction of charged particles and electromagnetic waves with matter; theory and characteristics of various detectors; statistics of counting, nuclear properties. Experiments in detection, techniques for investigating the nucleus and nuclear radiation. 1 hr lecture; 6 hrs lab. Prereq: Fundamentals of Physics: Electricity, Waves and Optics, Modern Physics.

4580 Principles of Nondestructive Testing (3) The detection and characterization of discontinuities in materials by nondestructive physical measurements. Ultrasonic, electromagnetic, holographic and penetrating radiation techniques are discussed. Prereq: 1 yr of fundamentals of Physics: Electricity, Waves and Optics, Modern Physics, or consent of instructor.


4720-30 Introduction to Health Physics (3, 3, 3) Radioactivity, interaction of electromagnetic radiation with matter, radiation quantities and units, point kernel and extended sources, x-rays and gamma rays, neutron activation interaction of charged particles with matter, stopping power, range-energy relations, counting statistics, shielding, dosimetry, waste disposal, criticality prevention, radiation biology and ecology. Prereq: 5760.

4720-30 Special Problems in the Teaching (1, 1) Theories in light broad, dispersion and absorption; scattering of light and X-rays; dielectric and magnetic properties of gases and solids. Optimal properties of electromagnetic waves in isotropic media including reflection, refraction and polarization and also theory of diffraction. Prereq: 5410-20 or equivalent.


5410-20-30 Experimental Methods of Infrared and Raman Spectroscopy (3, 3, 3) Vortical motion and boundary analysis, linear algebra, matrices, vector spaces; fourier series and integrals; spherical harmonics; bessel functions; linear second-order partial differential equations and their associated boundary value problems. Variational calculus; Green's functions; integral transform methods. Special attention is devoted throughout course to problems arising in physics. Prereq: Advanced calculus and differential equations. (Same as Mathematics 5460.)

5440 Radiation Chemistry (3) (Same as Chemistry 5440.)


5620 Advanced Topics in Classical Theory (3) Courses will be given to meet special needs of students. Possible topics are: (a) advanced dynamics and hydrodynamics; (b) electromagnetic theory; (c) statistical mechanics, including course on nonequilibrium processes. Prereq: 5310-20-30, 5410-20-30, 5610-20-30. May be repeated with consent of department.

5630 Advanced Topics in Quantum Theory (3) Courses will be given to meet special needs of students. Possible topics are: angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, dielectric and magnetic susceptibilities, history, and development of scattering and collision processes, theory of fields. Prereq: 610-20-30. May be repeated with consent of department.

5690-10 Electrical Conduction in Gases and Plasma Physics (3, 3) Electrical conduction in gases at high and low pressures. Characteristics of spark, arc and glow discharges. Collision theory of electrical relaxation phenomena; plasma oscillation; magnetohydrodynamics; instabilities. Topics of current interest in astrophysics, geophysics and thermonuclear research. Prereq: 3710-20-30 and either 5410-20-30 or Electrical Engineering 5310-20-30. (Same as Electrical Engineering 5690-10.)

5610 Interaction of Radiation with Gases (3) Interaction of electromagnetic radiation with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules; ionization; transion and light emission. Electron interaction, transport and capture in plasma and vacuum. Experiments. Prereq or coreq: 610-20-30.

5620 Interaction of Electrons with Solids (3) Collisions with free electrons; stopping power; electron slowing down spectrum; electron spin precession; electron emission; electron diffusion; plasma effects in irradiated solids; light emission from irradiated solids; techniques in electron microscopy; applications to dosimetry. Prereq or coreq: 610-20-30.

5630 Interaction of Radiation with Matter (3) Topics in atomic collision theory. Photon-storm

6710-20-30 Advanced Solid State Physics (3, 3, 3) Lattice dynamics; phonons; Brillouin zone; heat capacity, Energy, band structure of solids; cohesive energy, work function. Crystal oscillator strengths; effective mass approximation, Bloch, para-, and ferromagnetism; neutron diffraction, The Fermi surface. Superconductivity, Phonon and electron scattering from phonons, electrons, and defects. Excitations, polarons, surface states. Superconductivity, dislocations, and order defects. Prereq: 4630, 5210-20, Prereq or coreq: 4630 or 5240 or 5230, 6110 for 6710, 6120 for 6720.

6810 Vibrational Problems in Molecular Spectra (3) Normal coordinates and potential functions, group theoretical methods and selection rules in gases and condensed phases. Lasers, spectroscopy and nonlinear optical phenomena. Prereq: 5340-50 and 5420 or equivalent. (Same as Chemistry 6810)

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

Political Science

MAJOR DEGREES

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

Professors:
T. D. Unks (Head), Ph.D. Iowa; R. S. Avery, Ph.D. Northwestern; D. H. Carlisle, Ph.D. North Carolina; L. S. Greene* (Emeritus), Ph.D. Wisconsin; V. R. Reddell, Ph.D. Chicago; D. D. Mimno, Ph.D. Vanderbilt; H. Fias, Ph.D. Utah; M. R. Robinson, Ph.D. Syracuse; O. H. Stephens, Ph.D. Johns Hopkins; D. M. Welborn, Ph.D. Texas.

Associate Professors:
R. McEwen, Ph.D. Indiana; J. Dodd, Ph.D. Tulane; A. Elliott, Ph.D. Columbia; G. Evans, Ph.D. Vanderbilt; R. H. Hopkins, Ph.D. Syracuse; S. Osofsky (on leave), Ph.D. Syracuse; A. Elliott, Ph.D. Columbia; T. McN. Simpson, Ph.D. Johns Hopkins; T. A. Smith, Ph.D. Ohio State.

Assistant Professors:
M. Boughton, M.A. Tulane; W. Koehler, Ph.D. Cornell; W. Lyons, Ph.D. Oklahoma; G. Mauney, Ph.D. Tennessee; G. J. Ratliff, Ph.D. Michigan State; R. E. Robson, Ph.D. Maryland.

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

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of promoting sound governmental administration through research, publication, and consultation. The staff is as follows: Professor Unks (director); Professor Lyons (acting associate director), Robson (assistant director); Research Associates Brown, Durant, Kennedy, Thomas.

THE MASTER'S PROGRAM

See general requirements on page 19.

MASTER'S IN PUBLIC ADMINISTRATION

Specific requirements for graduation include:
1. The completion of 45 quarter hours of approved graduate courses including 9 hours of thesis work. In lieu of thesis, candidates may complete a total of 48 quarter hours of course work.
2. At least fifty percent of the credit hours including thesis must be in approved courses numbered 5000 and above.
3. Demonstration of command of the material covered in course work in an oral comprehensive examination. A non-thesis student must have a written examination which may be followed by an oral.

Inquiries concerning all programs should be directed to the Department of Political Science, Knoxville, Tennessee 37916.

THE DOCTORAL PROGRAM

Specific requirements for the degree of Doctor of Philosophy in Political Science include:
1. A minimum of 117 quarter hours, following the Bachelor's degree, is required. At least 93 hours shall be in political science. At least 72 hours in political science shall be graduate level hours (30 earned in 5000 or 6000-level courses). At least 45 of these graduate level hours shall be at the 6000 level. This figure includes 36 hours of credit for the dissertation.
2. Each Ph.D. candidate must pass an examination in one foreign language. Students specializing in some areas may be required to demonstrate knowledge of a second language or appropriate research tools or both.
3. Admission to candidacy shall be based on written and oral preliminary examinations which must be passed not later than three quarters before the date on which the degree is granted.
4. The passing of a final oral examination on the doctoral dissertation.
5. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.


3546 United States Constitutional Law: Civil Rights and Liberties (4) Emphasis on judicial interpretation of First Amendment freedoms, right of the accused, racial equality, and the right of privacy.

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

3555 Introduction to Public Administrative Organization and Management (4) Organization and decision-making theory, line and staff services, politics of organization, leadership, personnel and fiscal management, administrative responsibility, United States Government and Politics desirable as preceding course. (Same as Water Resource Development 3565)

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

3605 Political Change in Developing Areas (4) Characteristics and problems of political changes with primary focus on developing areas.

3815-16 Dynamics of Black African Politics (4, 4)

3821-22 Politics of Asian States (4, 4)

3825-26 Latin American Government and Politics (4, 4)

3831-32 Government and Politics of the Soviet Union (4, 4)

3835-36 Politics in Western Democracies (4, 4) Political culture, patterns, and institutions of Western democratic systems.

3841 Government and Politics of Middle East and North Africa (4)

3710 State Politics (4) Focus on formal and informal setting of state government; governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy.

3720 State Government and Policy Making (4) Nature and functions of the institutions of state government: governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy.

3750 The Urban Polity (4) Analysis of political institutions and processes in metropolitan areas.

3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas.

3795 Contemporary Problems of Soviet Foreign Policy (4)

3801 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought.

3802 Studies in Medieval Political Thought (4) From Augustine to Luther: emphasis on problems and theories of religion and politics.

3803 Studies in Early Modern Political Thought (4) Machiavelli through the Enlightenment.

3804 Studies in Nineteenth- and Twentieth-century Political Thought (4) Political theories of industrial and technological societies; nineteenth and twentieth century.

3880 American Political Thought (4) Examination of role of selected political ideas, doctrines, and themes in America, emphasizing their development and relationships to diverse political interests.

4410 Law and the Administrative Process (4) Powers of, procedures of, controls over administrators.

4535-36 Political Attitudes, Opinions and Communication (4, 4)

4540-50 Presidency, Congress and Public Policy (4, 4) The Presidency and Congress within framework of policy-making process.

4545-46 The Judicial Process (4, 4) The study of courts as components of political systems, and public policy formulation through judicial
decision making. United States Government and Politics desirable as preceding course.

4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

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

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

4630 Problems in Public Management (3) Selected problems. Emphasis on internal and external communication and information systems in government and public access to information.

4665-66 Policy Making in Democracies (4, 4)

4675 Special Topics in Comparative Government (4, 4)


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Analysis of selected theoretical and policy issues concerning international relations in the Americas with emphasis upon imperialism, intervention, and the Cuban Revolution, nationalism, foreign assistance, trade and economic integration.

4740-50-60 Politics and Elections (3, 3, 3) 4740—Structure and function of party systems; nominations and campaigns. 4760—Voting behavior of the electorate.

4815 Contemporary Soviet Marxism-Leninism (4)

4831-32-33 The Systematic Study of Politics (4, 4, 4)

4875 Special Topics in Political Thought (4) May be repeated with consent of department. Maximum 8 hrs.

4940 Politics and the Environment (4) Examination of formulation and implementation of environmental policies relating to physical environment with emphasis upon water and air pollution control.

4975 Practicum in Political Administration (4)

5000 Public Administration (3) Survey of public administration theory and functions, approaches to public management, contemporary problems in public administration.

5005 Research and Methodology in Public Administration (3) Introduction to basic assumptions and techniques of research in public administration, including measurement, analysis, and reporting of data.

5610-20 Seminar in Organization Theory (3, 3) Approaches to and methods used in comparative analysis.

5620 Seminar in Public Administration (3) Approaches to and methods used in comparative analysis.

5750-55 Seminar in Public Management (3, 3) Examination of selected topics.

5870 Seminar in Political Theory (3) Examination of selected topics.

5910-20-Behavioral and mathematical models in government. (3, 3)

5930 Seminar in African Politics (3) Selected topics in African politics.

5939 Seminar in Technology and Public Policy (3) Technological change and the policy process, government interaction with the scientific community, political characteristics of the scientific enterprise.

5950 Seminar in Metropolitan Areas (3, 3, 3) Seminar in Metropolitan Areas (3, 3, 3) Research into selected topics.

5960 Seminar in African Politics (3) Selected topics in African politics.

5970 Seminar in the Politics of Administration (3) An examination of public administration in the context of the American political system with emphasis upon policy making and the political roles of public administrators and agencies.

5975 Seminar in Organizational Analysis (3) Organization theory applications in public management; field analysis of public organizations.

5980 Seminar in Comparative Public Administrations (3, 3, 3) Seminar in Comparative Public Administrations (3, 3, 3) Research into selected topics.

6000 Doctoral Research and Dissertation

6100 Directed Research in Political Science (3, 3) Directed research in selected topics.

6102 Advanced Studies in International Politics (3)

6110 Advanced Studies in Political Theory (4) Research into selected topics.

6112 Advanced Studies in International Organization (3) Research into selected topics.

6120 Advanced Studies in Jurisprudence (3)

6130 Advanced Studies in Comparative Politics (3) Research into selected topics.

6140 Advanced Studies in American Constitutional Law (3, 3, 3) Systematic investigation of federal relations, civil liberties, courts in political settings, judicial institutions, and public policy content.

6150-20-30 Advanced Studies in American Constitutional Law (3, 3, 3) Systematic investigation of federal relations, civil liberties, courts in political settings, judicial institutions, and public policy content.

6160-20-30 Advanced Studies in Public Administration (3, 3, 3) Research into selected topics.

6170 Directed Research in Political Science (3) May be taken for a letter grade or on a S/NC basis. May be repeated with consent of instructor and student's advisor. Maximum 9 hrs.

6190-20 Advanced Studies in the Political Process (3, 3) Open to advanced graduate students upon approval of instructor.
Psychology

MAJOR

DEGREES

Psychology

M.A., Ph.D.

Professors:


Associate Professors:

H. S. Bacon,* Ph.D. Tennessee; C. P. Cohen, Ph.D. Kansas; L. F. Droppeleman, Ph.D. Catholic; H. R. Friedman,* Ph.D. Tennessee; S. J. Handel, Ph.D. Johns Hopkins; M. G. Johnson, Ph.D. Johns Hopkins; A. McIntyre, Ph.D. Yale; J. C. Malone, Ph.D. Duke; W. G. Morgan, Ph.D. Tennessee; W. M. Simmons, M.S.W. Tennessee; E. D. Sundstrom, Ph.D. Utah; C. B. Travis, Ph.D. California (Davis).

Assistant Professors:


The Psychology Department emphasizes doctoral degree programs with specializations in clinical, school, community, industrial-organizational and general psychology. 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 (1-4) Supervised participation as a tutor in individualized instruction. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

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


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

4460 Organizational-Industrial Psychology (5)

4510 Personality Theories (4) Prereq: Abnormal Psychology or equivalent.

4529 Personality and Social Systems (4) Prereq: Abnormal Psychology.

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: Human Relations and consent of instructor.

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

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

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

4660 The Psychology of Language (4) Theories and descriptions of phonology, syntax, and semantics as applied to psychology and related disciplines. Recommended: 4590 or Linguistics 4590.

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

4719 Physiological Psychology Laboratory (4) Coreq: 4710.

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

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

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

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

4850 Learning Theories (4) Historical and theoretical development of learning models. Prereq: Learning and Thinking.

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

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

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

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

5000 Thesis

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

5017 Colloquium in Experimental Psychology (1) Coreq: 5019. S/NC only.


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

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

5080 Current Topics in Applied Psychology (3)

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

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

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

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

5140-50-60 Psychoeducational Assessment (3, 3, 3) Naturalistic, psychometric, and sociometric assessment methods in school learning environments. Must be taken in sequence. Coreq: 5479-89-99. Prereq: Admission to School Psychology program or consent of instructor. (Same as Educational Psychology 5140-50-60).


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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5445 Advanced Correlational Methods (3) Bivariate, tetrachoric, and polychoric correlation; partial and multiple correlation and regression; stepwise regression and cross-validation; simple discriminant analysis; rank correlation methods. Prereq: 5435.

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

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

5500 Fundamentals of Psychometrics (4) Base course in theory and application in psychometrics. All the graduate students who plan to take one or more courses in psychometrics are required to take the course. Prereq or Coreq: 4640.

5510 Instrumentation for Psychological Research (3)

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

5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 5050-60-70 or equivalent and consent of instructor.

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

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

5580 Theories of Personality (3)

5581-82-83 Clinical Psychology I: Human Development and Personality (2, 2, 2) First quarter of the doctoral program in clinical psychology. Students take the 3-2 hr courses concurrently, each covering the content area from one to three major contemporary points of view.

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

5590 Psychodynamics (3) A research-and-theory-oriented course focusing upon the origins of behavior.

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

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

5610-20 Psychology of Learning (3, 3) Prereq: 5210 or Educational Psychology 5730.

5650 Ethics and Professions in Practice (1) A review and discussion of problems arising in the practice of clinical psychology. Offered in alternate years. Prereq: M.A. in psychology or equivalent.

5670 Forensic Psychology (2) The psychologist's role in relation to the law, including questions concerning licensure requirements, legal restrictions, and testimony as an expert witness. Offered in alternate years. Prereq: M.A. in psychology or equivalent.

5680 Neural Basis of Behavior (3) Neuroanatomy; the basis and symptomatology of neurological syndromes encountered in clinical psychology. Prereq: M.A. in psychology or equivalent.

5690 Psychopharmacology (3) A review and evaluation of pharmacology as it relates to psychology. Prereq: Consent of instructor. Offered in alternate years.

5713 Learning Modules for Techniques in Professional Psychology (1-4) A set of learning packages, each of which develops a skill in assessment, technology, child evaluation, or therapy. Prereq: Consent of instructor. May be repeated. S/NC only.

5750 Ethological Psychology (3) Evolutionary and physiological basis of comparative psychology and implications for human behavior. Prereq: Introductory Biology and graduate standing.

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

5769 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory procedures central to research in physiological psychology. Prereq: 4710, 4719 and consent of instructor. May be repeated with consent of instructor.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) (Same as Speech Pathology 5790.)

5810 Techniques of Psychological Examination (3) Development and administration of basic psychological techniques. Intended primarily for students in fields related to psychology using assessment procedures. Prereq or Coreq: 4640 or equivalent and consent of instructor.

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

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


5859-69-79 Practicum in Psychological Appraisals (2, 2, 2) Ordinarily to be taken concurrently with 5650-60-70.

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

5950-60-70 Consultation in Human Development Settings (3, 3, 3) Study of issues, models, and evaluation of the process of consultation in settings where human developmental needs and crises are managed by persons who seek aid from psychologists. Must be taken in sequence. (Offered in Educational Psychology 5950-60-70.)

5959-69-79 Practicum in School Psychology II (2, 2, 2) Second year School Psychology Pro-

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.

6491-2-3-4 Field Placement in Clinical Psychology Levels 1, 2, 3, 4, (1-8, 1-8, 1-8, 1-8) Supervised clinical experience. Required of and limited to students fully admitted to the Ph.D. program in Clinical Psychology. May be repeated. Maximum 9 hrs per course. B/NC only.

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

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

6571 Seminar in Mental Health Administration (3) Theory and practice in the organization and management of mental health administration.

6650-60-70 Systems Approaches in Psycholinguistics (3, 3) Systems and organization development approaches in schools and other human services settings. Prereq: Consent of instructor. (Same as Educational Psychology 6650-60-70.)

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

6710 Seminar in Physiological Psychology (3)

6720 Seminar in Comparative and Ethological Psychology (3)

6730 Methods of Ethological and Naturalistic Research (3) Current laboratory and field techniques. Prereq: 4729, 5750, 6720, or consent of instructor.


6780 Advanced Psycholinguistics (3) Language from psychological and associated points of view; methodological and theoretical problems. Prereq: Consent of instructor.


6870 Adult Psychotherapy (3) Prereq: 5580-90-600. Prereq or coreq: 6560-60.

6900 Field Work in Industrial and Organizational Psychology (1-15) (Same as industrial Management 6900.)

*Note: Psychology 5210-5300, 5350-60-70, 5819, 6310-400, 6419-29-35, 6710-20-30, 6750, 6840, 6870, and/or 6900 may be repeated for credit with the approval of the department.

Religious Studies

Professors:

F. S. Lusby (Head), B.D. Colgate Rochester; D. L. Dungan, Th.D. Harvard; R. V. Norman, Jr., M.D. Yale.

Associate Professors:

B. L. Daniels, Ph.D. Duke; W. L. Humphreys, Ph.D. Union; D. E. Linge, Ph.D. Vanderbilt; C. H. Reynolds, Ph.D. Harvard.

Assistant Professors:

J. Kim, Ph.D. Chicago; R. Lee, Ph.D. Harvard.

Instructor:


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.

3051-71 History of Western Religious Thought and Institutions (4, 4) 3061-71.

3210 Early Greek Mythology (3) (Same as Classics 3210.)

3220 Greek Mythology in the Classical Period (3) (Same as Classics 3220.)

3230 Roman Mythology (3) (Same as Classics 3230.)

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. Not open to freshmen. Prereq: Consent of instructor. (Same as Philosophy 3270 and Russian 3270.)

3411-12-13 Renaissance and Reformation (3, 3, 3) (Same as History 3411-12-13.)

3450 Religion of Primitive Peoples (3) (Same as Anthropology 3450.)

3590 Philosophy and Religion in India (4) (Same as Philosophy 3590.)

3650 Buddhist Philosophy and Religion (4) (Same as Philosophy 3650.)

3690 Philosophy of Religion (4) (Same as Philosophy 3690.)

4111-21 Modern Religious Philosophies (4, 4) Examination of the religious implications of major thinkers and movements. 4111—Nicolas of Cusa to Hume, 4121—Kant and the nineteenth century. Prereq: 9 hrs of philosophy other than logic. (Same as Philosophy 4111-21.)

4210 Topics in Ancient Israelite and Ancient Near Eastern Religions (4) Prereq: Ancient Israel’s Historical and Religious Traditions, The Rise of Judaism, or consent of instructor. May be repeated. Maximum 8 hrs.

4310 Jesus and Paul Compared (4) Jesus’ teaching and activity in the context of first-century Palestinian Judaism; analysis of what the Apostle Paul made of the tradition of and about Jesus. Recommended prereq: Introduction to Religions of the World or Introduction to Ancient Near Eastern Religions and Images of Jesus.

4370-71 Theoretical Issues in Medical Ethics (4, 4) (Same as Philosophy 4370-71.)

4410 American Religious Thought (4) Selected figures, movements and problems in American religious thought from colonial period to present. May be repeated. Maximum 8 hrs.

4450 Topics in American Religion (4) Prereq: one of the following: Religions in America, 4410; or consent of instructor. May be repeated. Maximum 8 hrs.

4540 Social and Religious Change (4) (Same as Sociology 4540.)

4610 Topics in Western Religious Thought and Institutions (4) Selected figures, issues and institutions. Seniors and graduate students only, except by permission of department. Prereq: History of Western Religious Thought and Institutions. May be repeated. Maximum 12 hrs.

4640 Topics in Early Christianity and Hellenistic Religions (4) Selected figures, issues and institutions. Seniors and graduate students only, except by permission of department. Prereq: Introduction to Near Eastern Religions or permission of instructor. May be repeated. Maximum 12 hrs.

4670 Topics in Eastern Religions (4) Selected figures, issues and institutions. Seniors and graduate students only, except by permission of department. Prereq: 3560-50. May be repeated. Maximum 12 hrs.

4810-20-30 Readings and Research in Religious Studies (3-4, 3-4, 3-4)

4840 Readings in Selected Languages Related to Religious Studies (3-4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4930 Sociology of Religion (4) (Same as Sociology 4930.)

4950 Theory of Religion (4) Elements for construction of a theory of religion drawing on resources from fields of psychohistory, social psychology, sociology of religion, cultural anthropology, theology and comparative religion.

4960 Tradition, Change and Modernity in Asia (4) Comparative study of processes of religious and social change 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.)

5010 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

5103 Independent Study (1-12) See page 148.

5310-20 Topics in Religion and Society (4, 4)

5510-20 Topics in the History of Religion (4, 4)

5710-20 Topics in Religious Thought (4, 4)

Romance Languages

MAJORS

DEGREES

French

M.A., Ph.D.

Spanish

M.A., Ph.D.

M.ACT

MAJORs

French

Spanish

M.A., Ph.D.

MACT

French

Spanish

M.A., Ph.D.

Graduate students may major in French and Spanish with the approval of the department.

The Department of Romance Languages offers three advanced degrees: the Master of Arts in College Teaching (M.A.C.T.) 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 credits in supervised instructional experience. French or Spanish must be selected as the major subject, and at least 36 hours of graduate 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 shall consist of at least 18 hours of which at least 12 hours must be numbered above 5000 and the rest above 4000, and should represent a meaningful complement to the student's area of concentration. In addition 9 hours of courses above 4000 in a related discipline are required. In special cases the latter requirement may be waived in favor of additional course work in the major field.

Language Requirements:
Students are expected to demonstrate written and oral 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 other, 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 22-23.

Arabic
3510-20 Intermediate Modern Standard (4, 4)
3610 Islamic Literature in English Translation (4) Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian, and Turkish. Readings include The Arabian Nights, The Rubaiyat of Omar Khayyam and Gibran's The Prophet.
5070-80-60 Hispano-Arabic Literature and Culture (3, 3, 3) (Same as Spanish 5070-80-60).
5101 Foreign Study (1-12) See page 148.
5102 Off-campus Study (1-12) See page 148.
5103 Independent Study (1-12) See page 148.

French
3610-20-30 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.
4010 Masterpieces of French Literature in English Translation (3) No foreign language credit.
4020 Masterpieces of French Drama in English Translation (3) No foreign language credit.
4110-20 French Literature of the Seventeenth Century (3, 3, 3) Prereq: Intermediate French (third quarter) or equivalent.
4150 Theatrical French (1-3) Performance in one or more French plays. May be repeated with consent of department. Prereq: 1 year of Intermediate French or equivalent and consent of instructor.
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 hours of courses on 3000 level.
4210-20-30 Phonetics and Advanced Grammar (3, 3, 3) Prereq: Intermediate French (third quarter) or equivalent.
4250 Introduction to Descriptive Linguistics (3) Phonetics and phonology, morphology, syntax, types of languages, linguistic groups, dialects and dialect geography. The application of descriptive linguistics—field linguistics, dialect study; its practical use in learning languages and in language teaching. An 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 the department (Same as German and Spanish 4250).

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German 4260.)
4270 Introduction to Romance Linguistics (3) A study of the development of Classical Latin through Vulgar into the major Romanic languages. (Same as Spanish 4270.)
4310-20-30 French Literature of the Eighteenth Century (3, 3, 3) Prereq: Intermediate French (3rd quarter) or equivalent.
4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French (third quarter) or equivalent.
4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French (third quarter) or equivalent.
4640-50-60 French Literature of the Sixteenth Century (3, 3, 3) Prereq: Intermediate French (third quarter) or equivalent.
4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French (third quarter) or equivalent.
5000 Thesis
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of the M.A. program. An intensive course in explication de texte.
5101 Foreign Study (1-12) See page 148.
5102 Off-campus Study (1-12) See page 148.
5103 Independent Study (1-12) See page 148.

5210 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships except those whose previous training or experience warrants their being excused by the department.
5151-61-71 Bibliography and Methods of Research (1, 1, 1) as Italian and Spanish 5151-61-71; S/NC only.
5210-20-30 French Literature of the Sixteenth Century (3, 3, 3)
5310-20-30 French Directed Readings (3, 3, 3)
5350-60-70 The Philosophes (3, 3, 3) Textual analyses of the works of Voltaire, Diderot, Rousseau, and eighteenth-century writers.
5410-20-30 The French Novel (3, 3, 3)
5450-60 Lyric Poetry of the Nineteenth Century (3, 3, 3) 5450—German and English influences on French Romanticism and the gen-
erotation of the poets of "le mal du siècle," 5460—Víctor Hugo; the Parnassians.

5470 Baudelaire and the Symbolists (3) A study of Les Fleurs du mal and Petit poèmes en prose. 5480—With special emphasis upon the theories of color and "correspondances" and their influence on the Symbolist school.

5510-20-30 The French Drama (3, 3, 3)

5610-20-30 Trends in Contemporary French Literature (3, 3, 3)

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in the form of compositions, sketches and original stories.

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

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

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

Italian

3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian (third quarter) or equivalent.

3310-20-30 Italian Literature in English Translation (3-4, 3-4, 3-4) 3310—The Sicilian School, the Florentine School, Dante, Petrarch, Boccaccio, Machiavelli, Ariosto, Tasso. 3320—From the Baroque through nineteenth century, commedia dell'arte, Vico, Leopardi, 3330—Twentieth century, Carducci, Pirandello, Quasimodo, D'Annunzio, Croce, Moravia. No foreign language credit. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs.

3510-20 Aspects of Italian Literature (4, 4) Prereq: Intermediate Italian or equivalent. Recommended for literature majors.

4010-20 Italian Drama in English Translation (3-4, 3-4, 3-4) 4010—La commedia dell'arte and major works of Machiavelli, Metastasio, Alfieri, Goldoni. 4020—Twentieth-century theatre: operatic drama, the Grottesco, Pirandello, De Filippo, Pratella. First. No foreign language credit. No change in credit hours after add deadline. Option of 4 hrs credit must present an appropriate amount of extra work above that required for 3 hrs.

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

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 6 hrs of courses on 3000 level.

4220 Petrarch (3) Prereq: 3520 or equivalent.

4230 Boccaccio (3) Prereq: 3520 or equivalent.

4330 History of the Italian Language (3) Prereq: 3330 or equivalent.

4410-20-30 The Literature of the Rinascimento (3, 3, 3) From Poli to Tasso, the Quattrocento, and the Cinquecento. Prereq: 3520 or equivalent.

4530 The Modern Novel (3) Prereq: 3520 or equivalent.

4540 The Modern Theatre (3) Prereq: 3520 or equivalent.

4610 Contemporary Theatre (3) Prereq: 3520 or equivalent.

4620 Contemporary Poetry (3) Prereq: 3520 or equivalent.

4630 Contemporary Prose (3) Prereq: 3520 or equivalent.

5011 Techniques in Literary Analysis (2) An intensive course in explication de texte.

5101 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

5103 Independent Study (1-12) See page 148.

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

5610-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department.

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

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

Portuguese

3510-20 Aspects of Portuguese Literature (4, 4) Prereq: Intermediate Portuguese or equivalent. Recommended for literature majors.

4310-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) May be repeated with consent of instructor.

5101 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

5103 Independent Study (1-12) See page 148.

3010 Spanish Masterpieces of Spanish Literature in English Translation (3) No foreign language credit.

4040 Masterpieces of Spanish Drama in Translation (3) No foreign language credit.

4050-60-70 Hispano-Arabic Literature and Culture (3, 3, 3) Readings in Arabic classical muwashshah, the colloquial za'al, and the later villancico. Readings in Arabic and Spanish. (Same as Arabic 5070-80-90.)

5101 Foreign Study (1-12) See page 148.

5102 Off-campus Study (1-12) See page 148.

5103 Independent Study (1-12) See page 148.

5110-20-30 Old Spanish (3, 3, 3) Medieval Spanish language and literature.

5121 College Teaching of Romance Languages (3) Seminars, demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural assimilation, 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 the department.

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

5211 Don Quixote (3, 3) Must be taken in sequence.

5212-22-32 Golden Age Prose (3, 3, 3) 5212—La Celestina; critical study of Fernando de Rojas' life and work. The Celestinesque genre; Feliciano de Silva's Segunda Celestina. 5222—Spanish philosophical thought; mystical prose; satirical works. 5232—Alarache and the Spanish picaroque genre.

5231 The Exemplary Novels, Persiles y Sigismunda (3)

5250-60 The Generation of '98 (3, 3) Angel Ganivet, Giner de los Ríos, Baraja, Unamuno, Vicente Bianco, Bensvenite, Azorín, Pérez de Ayala.

5270 The Contemporary Novel (3) The Civil War and post-Civil War period.

5310-20-30 Directed Readings (3, 3, 3)

5311-21-31 Special Topics in Spanish or Spanish American Literature (3, 3, 3) May be repeated.
5340 Problems in Hispanic Culture (3) Intensive study of prevailing social, political, and artistic literary and ideological conditions and patterns of any area or period within Spanish or Latin American culture. May be repeated with permission of department. Maximum 6 hrs.

5510-20-30 The Spanish Theatre after the Golden Age (3, 3, 3) 5510—From the eighteenth century through Romanticism. 5520—From Realism through the Generation of 1930. 5530 —Contemporary theatre.


5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay.

5611-21 Spanish American Lyric Poetry (3, 3)

5620-30 The Modern Novel in Spanish America (3, 3)

5631 Spanish American Essay (3)

5632 The Spanish American Short Story (3) The short story as a major literary genre in Spanish America. Reading and criticism of the works of authors such as Darío, Quiroga, Borges, Arrelía, and Rufio.

5633 Twentieth-century Latin American Theatre and Film (3) Readings from the works of playwrights such as Carlos Solórzano, Rodolfo Usigli, Conrado Haie Roxlo, Roberto Castellanos, Maria Luisa Reyna, and Isadora Rivas. Presentation of films as adaptations of classics such as Doña Bárbara, Los de abajo and Don Segundo Sombra as well as exponents of the experimental cinema of today.

5640 Latin American Women Writers (3) An introduction to the works of Latin American women writers, focusing on the feminine point of view, the modern image of woman, male-female relationships and society as a context for woman's destiny. Readings from poetry and fiction, including such authors as Alfon- sina Storni, Delmira Agustini, Gabriela Mistral, Silvina Buílrich, Silvina Ocampo, and Rosario Castellanos.

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary style in the forms of compositions, sketches and original stories.

5670 Problems in Romance Linguistics (3) (Same as French 5670.)

5610-20-30 Spanish Lyric Poetry (3, 3, 3) 5610-20-30 Spanish Lyric Poetry (3, 3, 3) 5610-20-30 Spanish Lyric Poetry (3, 3, 3)

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

6000 Doctoral Research and Dissertation

6210-20-30 Seminar in Spanish Literature (3, 3, 3) Topics vary in the field of Peninsular Literature. May be repeated with consent of department.

6310-20-30 Seminar in Latin American Literature (3, 3, 3) Topics vary. May be repeated with consent of department.

Russian
See German

Sociology

MAJOR DEGREES Sociology M.A., M.A.T., Ph.D.

Professors: D. M. Boz, (Head), Ph.D. North Carolina; J. A. Black, Ph.D. Iowa; J. J. Champion, Ph.D. Purdue; W. E. Cole (Emeritus), Ph.D. Cornell; L. E. Dotson, Ph.D. Vanderbilt; L. Ebersole, Ph.D. Pennsylvania; S. Wallace, Ph.D. Minnesota.

Associate Professors: D. M. Boz, Ph.D. Michigan State; D. Clevland, Ph.D. Michigan State; D. Hassing, Ph.D. Massachusetts; T. C. Hood, Ph.D. Duke; R. Perrin, Ph.D. British Columbia; N. Shover, Ph.D. Illinois.

Assistant Professors: S. Kurth, Ph.D. Illinois; S. Norland, Ph.D. Iowa; T. Weirath, Ph.D. Wisconsin.

For a full statement of departmental requirements, students are referred to the Departmental Graduate Manual. All registration for 3000- and 4000-level courses requires the consent of the Instructor.

THE MASTER'S PROGRAM

The department offers both the thesis and non-thesis option for a Master's degree. For information concerning the Master's degree with thesis, see the General Requirements on page 19. Those interested in the non-thesis option should obtain details from the department.

THE DOCTORAL PROGRAM

General requirements for the degree of Doctor of Philosophy are described on page 22. Additional specific requirements for the degree of Doctor of Philosophy in Sociology include:

1. A minimum of 108 credit hours following the Bachelor's degree, exclusive of credits for the Master's thesis, is required. Of this number, 36 hours shall be allocated to doctoral research and dissertation. A maximum of 12 hours credit outside the major may be taken in related fields, with the approval of the student's committee. Exclusive of doctoral research and dissertation at least one-half of all credits shall be in courses numbered 5000 or 6000.

2. A written preliminary examination covering sociological theory, research methodology, and two other areas in sociology must be passed prior to admission to candidacy. This examination must be passed not later than one academic year before the date on which the degree is granted.

3. No later than one month before granting of the degree, the candidate will be required to pass an oral examination on the doctoral dissertation. At the oral examination the candidate will be expected to show a thorough knowledge of sociological theory and methodology related to the research.

4030 Society and Law (4) A general treatment of the social origins and consequences of law and the legal process. Particular emphasis is placed on problems of law and social change, and on the structure and functioning of legal sanctions. Some attention is paid to law and law-like phenomena in formal organizations and primitive societies.

4110 Population Problems (4) Demographic factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.

4120 Topics in Social Psychology (4) (Same as Psychology 4120.)

4130 Sociology of Punishment and Corrections (4) Trace development of correctional move-
Theatre

3121-22 Advanced Acting (4, 4) Historical styles of acting. 3121—Renaissance, 3122—seventeenth and eighteenth centuries.
3151-52 Major Productions (1-4, 1-4)
3153 Outdoor Repertory Production (4)
3221-22 Introduction to Stage Design (4, 4) Descriptive drawing as an approach to three-dimensional design; theatrical graphic standards; problems in stage design with reference to lighting; movement, scale and style. Prereq: Stagecraft or consent of instructor.
3262-63 History of American Theatre (4, 4) Development of theatre as social institution in American life. 3262—From its beginnings to 1900. 3263—From 1900 to present.
3321-22 Introduction to Lighting Design (4, 4) Mechanical and stage lighting; elementary theory; problems in basic lighting practice. Prereq: Stagecraft and consent of instructor. Must be taken in sequence.
3451-52 Play Directing (4, 4) Must be taken in sequence. Prereq: Acting.
3511-12 Special Problems in Acting (4, 4) Advanced exercises in voice and movement; preparation of major roles with particular emphasis on problems of play interpretation. Prereq: Basic stage coaching or consent of instructor.
4333-34 Special Problems in Acting (4, 4) Advanced exercises in voice and movement; preparation for major roles with particular emphasis on problems of play interpretation. Prereq: Basic stage coaching or consent of instructor.
4351 Major Productions (1-4, 1-4) Continuation of 3151-52. Available for credit only to theatre majors Prereq: Consent of instructor.
4513 Outdoor Repertory Productions (4) Continuation of 3153. Available only to members of summer company by consent of instructor.
4241-42 Advanced Stage Design (4, 4) Play interpretation through scenic means; setting as environment for dramatic action. Prereq: 3221-22 and consent of instructor.
4341-42 Advanced Lighting Design (4, 4) Relation of light to setting in creating stage environment. Prereq: 3321-22 and consent of instructor. Must be taken in sequence.
4541-42 Advanced Theatre Costume Design (4, 4) Advanced problems in costume design and construction; pattern drafting; draping. Prereq: 3511 or 3612.
4751-52 Dramatic Theory and Criticism (4, 4) 4751—From Aristotle to Lessing. 4752—from Goethe to Sartre.
4951-52 Playwriting (4, 4) Prereq: Consent of instructor.
5250 Seminar in Playwriting (3)
5310 Studies in European Theatre History (3) May be repeated. Maximum 9 hrs.
5320 Studies in American Theatre History (3) May be repeated. Maximum 9 hrs.
5620 Projects in Lighting Design (3) May be repeated. Maximum 9 hrs.

Speech Pathology

See Audiology and Speech Pathology

Zoology

MAJORS

Radiation Biology
M.S., Ph.D.

Professors:
J. C. Daniel, Jr. (Head), Ph.D. Colorado; R. M. Bagby, Ph.D. Illinois; M. D. Pan, Ph.D. Oklahoma State; J. G. Carlson, Ph.D. Pennsylvania; A. C. Cole, J. E. (Emeritus), Ph.D. Ohio; D. A. Elmer, Ph.D. Minnesota; R. C. Fraser, Ph.D. Minnesota; R. F. Grell, Ph.D. Tennessee; B. Hochman, Ph.D. California (Berkeley); J. C. Howell, Ph.D. Cornell; K. W. Jeon, Ph.D. London (England); A. W. Jones, Ph.D. Virginia; J. R. Kennedy, Ph.D. Iowa; J. R. Lamb, M. A. (Emeritus), Ohio State; L. E. Roth, Ph.D. Chicago; C. A. Shivers, Ph.D. Michigan State; J. T. Tanner, Ph.D. Cornell; S. R. Tipton (Emeritus), Ph.D. Duke; G. L. Whitson, Ph.D. Iowa.

Associate Professors:
B. D. Burnham, Ph.D. Iowa; J. C. Fox, Ph.D. Hopkins; A. M. Jungreis, Ph.D. California; J. A. MacCable, Ph.D. California (Davis); S. E. Riecher, Ph.D. Wisconsin; G. A. Vaughan, Ph.D. Duke; H. G. Welch, Ph.D. Florida; M. C. Whiteside, Ph.D. Indiana.

Assistant Professors:
P. B. Coulson, Ph.D. Illinois; A. C. Echtenacht, P. D. Kansas; E. Frederick, Ph.D. Northern Arizona; M. A. Handel, Ph.D. Kansas State; M. Pan, Ph.D. Pennsylvania.

Requirements for admission: Applicants for graduate study are expected to have a background no less extensive than that required of undergraduate majors in this department. This includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are: (1) general zoology or general biology, 12 quarter or 8 semester hours; (2) upper division zoology, 18 quarter or 12 semester hours; (3) chemistry, two years including 12 quarter or 8 semester hours of general inorganic; (4) mathematics, 9 quarter or 6 semester hours including differential and integral calculus; (5) physics, 12 quarter or 8 semester hours; (6) Graduate Record Examination scores (Verbal, Quantitative and
Advanced Biology); and (7) a grade point average of 3.0 out of a possible 4.0. Otherwise superior students, deficient in one or more of the above requirements, may be admitted by the Graduate Affairs Committee. A course in biostatistics is required of all candidates for an advanced degree in Zoology. All aspirants for advanced degrees in Zoology must exhibit competency in four (M.S.) or five (Ph.D.) of six areas of zoology as determined by a comprehensive examination. Students must take this examination during the fall quarter of the first year and may repeat the examination the following fall quarter if unsatisfactory scores are received. Competency must be exhibited within this two-year period for a student to continue in the program. Preparation for thesis or dissertation: During the first year a written examination and a special research problem in each of two faculty members' laboratories will determine the student's preparation for thesis or dissertation study.

THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee; (2) the preliminary examination will be an oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizeable 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 3000 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 doctoral level of training or proficiency in a second foreign language but may not require that the student take the official language examination in the second language.

3040 Natural History of the Vertebrates (5) Behavior, life history, phylogeny, and classification. 3 hrs and 2 labs or field periods.

3050 Comparative Vertebrate Embryology (5) Developmental morphology of selected vertebrates. 2 hrs and 3 labs.

3060 Comparative Vertebrate Anatomy (4) Anatomy of organ systems. Dogfish shark and cat used in laboratory. 2 hrs and 2 labs.

3071 Immunology (3) (Same as Microbiology 3071.)


3110 General Entomology (5) Introduction to insects; basic structure, development, behavior; classification of insect orders and representatives; interpretation and use of keys. Prereq: General Ecology or consent of instructor. 3 hrs and 2 labs.

3150 Invertebrate Zoology (5) Biology of invertebrates (except insects) with emphasis on ecology and behavior. Prereq: General Ecology. 3 hrs and 2 labs.

3220 Physiology of Reproduction (3) (Same as Animal Science 3220.)

3320 Histology (4) Study of animal tissues. Prereq: Cell Biology. 2 hrs and 2 labs.

3410 Bioethics (3) Relationship between biological discoveries and human values. Open discussion of ethical dilemmas arising from new knowledge about medicine, behavior, resources, and technology.

4007, 4010-4017 Minicourse in Zoology (2 hrs each) Selected advanced topics in zoology, concentrated in time and subject matter. Consult departmental listing for actual topics to be offered. Prereq: As posted. May be repeated.

4050 Developmental Biology (4) Experimental morphogenesis, fertilization, cellular interactions, hormonal effects and related topics with examples drawn primarily from invertebrates and vertebrates. Prereq: 3050, Cell Biology and General Ecology. 2 hrs and 2 labs.

4120 Undergraduate Research Participation (2) Experience in investigative research projects under supervision of staff members. Prereq: Consent of Instructor.

4130 Practicum in Zoology (1-3) Participation in practical application of zoology in community institutions, government organizations and industry. Approximately 5 hours involvement per week. Prereq: General Genetics, Cell Biology, General Ecology, and senior standing.

4190 Mammalogy (4) Classification, evolution, distribution, reproduction, populations, and behavior. 2 hrs and 2 lab or field periods.

4200 Ichthyology (5) Classification, collection and identification, distribution, life histories, and economic importance of fishes. Prereq: General Ecology or consent of instructor, 2 hrs and 2 lab or field periods.

4210 Cell Physiology (5) Development of modern concepts in cell physiology from point of view of information and control which examines kinetics and integration of cellular activities. Prereq: Cell Biology or any physiology, and Organic Chemistry. Recommended: Biochemistry. 3 hrs and 1 lab.

4240 Animal Ecology (4) Environmental factors determining the distribution and numbers of animals; interspecific relations; problems and methods. Prereq: General Ecology. 2 hrs and 2 labs.

4250 Comparative Animal Physiology I (3) Environmental physiology. Survey of physiological mechanisms and their relation to ability of animals to survive in diverse physical environments. Prereq: Cell Biology, General Ecology and 2 yrs chemistry.

4259 Comparative Animal Physiology Laboratory I (1) Coreq: 4250.

4260 Comparative Animal Physiology II (3) Sensory, effecter and integrative physiology. Prereq: Principles of Animal Physiology.


4270 Advanced Immunology (2) (Same as Microbiology 4270.)

4280 Comparative Endocrinology (3) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates and invertebrates. Their role and interaction in maintenance of the organism and species. Prereq: Principles of Animal Physiology or

Hormones and Endocrine Function (3 hrs and 1-3 hr lab.

4290 Herpetology (4) Classification, distribution, life histories, collection and identification of amphibians and reptiles. Generally of local species. 2 hrs and 2 labs or field periods.

4300 Ornithology (4) Morphology, physiology, behavior, reproduction, populations, evolution, field identification. 2 hrs and 2 labs or field periods.

4310 Nuclear Cytoloy (4) Chromosome structure and behavior in mitosis and meiosis. 1 hr and 3 labs. Prereq: General Genetics.

4320 Microtechnique (4) Prereq: 3320 recommended. 2 hrs and 2 labs.

4330 General Cytology (4) Study of cellular organelles at the light and electron microscope levels and the functioning of these organelles. Prereq: Cell Biology.

4369 General Genetics Laboratory (2) Experiments designed to illustrate basic principles of inheritance. Prereq: General Genetics. 2 labs.


4410 General Parasitology (4) Morphology, taxonomy and ecology of parasitic worms and protozoa, with emphasis on host-parasite relationships. 3 hrs and 1 lab.

4430 Medical Entomology (4) Distinctive morphological features, distribution, life histories, and control of arthropods that parasitize man or serve as vectors of human pathogens. Recommended prereq: Agricultural Biology 3210 or General Ecology. (Not open to students with credit for 4340.)

4450 Protozoology (4) Morphology, taxonomy, and physiology of protozoa in relation to fundamental biological concepts. 2 hrs and 2 labs. Recommended prereq: Cell Biology.

4610-20 Comparative Animal Pathology (2, 2) Abnormal morphological changes and their causes. 4610—Cell and tissue changes. 4620—Organ, organ system, and organism changes. Recommended: 3060, 3068, 5320.

4619-29 Comparative Animal Pathology Laboratory (2, 2) 4619-20 Comparative Animal Pathology Laboratory. 4629—Organ, organ system, and organism changes: Coreq: 4610-20.

4660-70 Limnology (4, 4) 4660—Effects of origin, age, and location of lakes on their physical and chemical nature. 4670—Lake communities, productivity and pollution. Prereq: General Chemistry, General Ecology. Recommended: General Botany and Introductory Physics. 2 hrs and 2 labs (4660); 3 hrs and 1 lab (4670). Must be taken in sequence, except with consent of instructor. Not open to students with credit for former 3640 or 4660.

4700 Arachnology (4) Biology of spiders, mites, scorpions, and relatives. Prereq: 3110, or 3150. 2 hrs and 2 labs.

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

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

4810-20-30 Insect Morphology and Taxonomy (4, 4, 4) 4810—Internal morphology of both genitalia, the mouth parts, and integumentary forms. 4820—Taxonomy of major orders. 4830—Taxonomy of minor orders and immature forms. Prereq: 3110 or consent of instructor for 4820-30, 2 hrs and 2 labs.
5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5580 Graduate Research Participation (3) Advanced research techniques are studied under the supervision of a staff research director whose interests coincide with those of the student. Open to all graduate students in good standing. Prereq: Consent of department and research director. Course may be repeated with consent of the department. S/N/C only.

5110-20-30 Special Problems (2, 2, 2)

5150 Zoological Bibliography (1) Study and practice in methods of locating and using zoological literature, bibliographies, and abstracts, and of preparing bibliographies and scientific papers.

5180 Fresh Water Invertebrate Zoology (4) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Laboratory and field study. Prereq: 3150.

5210 Plant Parasitic Nematodes (4) (Same as Agricultural Biology 5210.)


5270 Advanced Neurophysiology (5) Cellular and molecular aspects of phenomena associated with conduction of excitation and muscular contraction. Prereq: 4250. 3 hrs and 2 labs.

5280 Insect Physiology (4) Functions and interrelations of the systems relative to metabolism, growth, coordination, movement, and reproduction. Prereq: 4810, 1 yr General Chemistry or consent of instructor. 2 hrs and 2 labs.

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

5310-20 Seminar in the Teaching of College Zoology (2, 2) Current concepts and principles in the teaching of zoology; modern techniques and instrumentation; supervised application of teaching principles and methods. Must be taken in sequence. Prereq: Consent of instructor. S/N/C only.

5350 Biometry (3) Statistical methods used in analysis of quantitative biological data. Prereq: 1 quarter statistics or consent of instructor.

5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.

5430 Advanced Medical Entomology (3) Prereq: 4330.

5550 Advanced Ornithology (4) Classification, distribution, and anatomy of birds. Prereq: 4300.

5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5580 Graduate Research Participation (3) Advanced research techniques are studied under the supervision of a staff research director whose interests coincide with those of the student. Open to all graduate students in good standing. Prereq: Consent of department and research director. Course may be repeated with consent of the department. S/N/C only.

6000 Doctoral Research and Dissertation

6110 Seminar in Cellular Biology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6140 Seminar in Immunobiology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6210 Seminar in Physiology (2) Prereq: Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) Prereq: 4310. May be repeated. Maximum 6 hrs.

6350 Seminar in Developmental Biology (2) Internal regulation in the differentiating cell. Prereq: 3030, 4050; Biochemistry 4110-20.

6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

6510 Seminar in Genetics (2) Prereq: General Genetics. May be repeated. Maximum 6 hrs.

6610 Seminar in Ornithology (2) Prereq: 4300. May be repeated. Maximum 6 hrs.

6510 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, Freshwater Fishery Biology, 4660-70, Botany 5061, or consent of instructor. May be repeated. Maximum 6 hrs.

6710 Seminar in Ecology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6910 Seminar in Radiation Biology (2) Prereq: Any 2 of 4200, Freshwater Fishery Biology, 4660-70, or 5510-20-30. (At least one-half of the student's program must be at the 5000 level.) A thesis is required of all students.
THE DOCTORAL PROGRAM

(1) Courses: In addition to those required for the Master's degree, Chemistry 4910-20-30 or 3410-20-30; Physics 3710-20-30; (Chemistry 3810 may be substituted for Physics 3730); Zoology 5620. Additional course requirements are determined by the student's faculty committee. The student's special field of interest and plans for a career determine these requirements. The more important courses from which selection may be made are advanced courses in biochemistry, botany, chemistry, electrical engineering, mathematics, microbiology, physics, and zoology. Courses are available in The University of Tennessee Graduate School of Biomedical Sciences at Oak Ridge. (2) The preliminary examination will consist of oral and written portions in radiation biology and in allied fields in which the candidate has received training. (3) Candidates will be required to pass, before the preliminary examination is taken, the official reading examination of the University in only one foreign language, or must earn a B average or at least a B in the last quarter of an appropriate language sequence, but the student's faculty committee may require other levels of training or proficiency in an additional foreign language. (4) The final examination will be an oral examination covering the candidate's dissertation and such other fields as the candidate's faculty committee may specify.

Regular attendance at the weekly Radiation Biology Seminar or an appropriate Departmental Seminar is expected of all students.

General Information

FOREIGN STUDY COURSES

Foreign study courses offered in some departments of the College provide an opportunity to undertake independent study outside the United States. Prior to departure the student must have a plan of study approved by the department head and a supervising faculty member of the department concerned. Credit will be given only upon fulfilling all requirements set by the department and may vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

INDEPENDENT STUDY

Certain educational goals may best be met through independent study done by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain the approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

OFF-CAMPUS STUDY

Recognizing that learning is not restricted to formal classroom situations, the College provides for students to earn credit toward graduation for approved off-campus study. Such study may be undertaken only with prior approval of the faculty member and the department concerned. It may include certain kinds of work experiences, community involvement, working in political campaigns, etc. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

INDEPENDENT STUDY

Certain educational goals may best be met through independent study done by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain the approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.
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 fulltime clinical practice experience following completion of a baccalaureate nursing program; c. who are Tennessee residents; d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program; or e. who are currently employed as nurse educators in programs preparing registered nurses; or f. who are currently employed as directors of nursing service.
4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.

DEGREE REQUIREMENTS

1. Students must complete 60 quarter hours of graduate level course work with a cumulative GPA of 3.0 or better.
2. The 60 credit hours must include the following components:
   - Core requirement: 14 hrs
   - Clinical concentration option: 26 hrs
   - Functional concentration option: 11 hrs
   - Electives: 9 hrs
   - 60 total credits

3. A Master's thesis is not required, but those students who wish to complete a thesis as a part of their program may substitute the thesis for the 9 elective hours.
4. Those students who do not choose the thesis option must successfully complete a comprehensive final examination.
5. Students may choose either primary or secondary care as a clinical concentration option. Students selecting the primary care nursing clinical option must complete the following courses: 4770, 5220, 5240, 5260, 5550, 5650. Students selecting the secondary care nursing clinical option must complete the following courses: 5120, 5130, 5160, 5310, 5330.
6. The core requirement which must be completed by all students regardless of clinical option includes 5120, 5130, 5160, 5310, 5330, and a 4-hour graduate level statistics course which must be approved in advance by the student's faculty advisor.
7. Students may select a functional concentration option in teaching, management or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5630. Students selecting the management option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the advanced clinical practice option must complete 5560 and 5660 if their clinical option is primary care or 5320 and 5340 if their clinical option is secondary care. All courses taken in other colleges must be approved in advance by the student's faculty advisor.
5210 Nursing Research Methods (4) Utilization of the research process to identify and solve common nursing problems; methods of data collection and analysis; effective use of the literature; approaches to presentation and publication of findings. Prereq: Graduating level course in behavioral or biomedical statistics.

5220 Principles of Health Maintenance (3) Health and its meaning to various community groups; health screening, counseling, and education as approaches to health maintenance; health promotion and its relationship to the quality of life; the economics of health maintenance. Prereq: 5010.

5240 Management of Common Health Problems (4) Indications for treatment and referral; use of protocols and treatment plans; pharmaceutical agents in common use; intervention in emergencies. Prereq: 5010, 5220. 2 hrs and 2 labs.

5260 Chronic Health Problems (4) Identification and in-depth exploration of health problems of a long term or life long nature which are common to people in various age groups over the 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: 5220. 2 hrs and 2 labs.

5296 Advanced Family Health Care (4) Nursing and health care management of families in the child-bearing and child-rearing stages of development; advanced developmental theory, changing family dynamics, management of women during pregnancy, labor and delivery, and post partum period, assessment of newborn infants. Prereq: 5220. 2 hrs and 2 labs.

5310 Secondary Care Nursing Field Work I (3) Advanced clinical practice in acute care hospital settings with opportunities to apply newly acquired nursing knowledge to more complex clinical nursing situations. Prereq: 5120-30 or 5140-50.

5320 Secondary Care Nursing Field Work II (3) A continuation of 5310 with emphasis on further acquisition and refinement of nursing skills needed to provide high quality nursing care to acutely ill patients. Prereq: 5310.

5330 Secondary Care Nursing Field Work I (2) A weekly on-campus seminar taken concurrently with 5310; seminar topics will focus on a discussion of nursing problems commonly encountered in acute care settings.

5340 Secondary Care Nursing Field Work II (2) A continuation of 5330 to be taken concurrently with 5320.

5410 Principles of Community Mental Health I (3) The epidemiology of mental health; sociocultural, religious, and economic variables affecting the mental health status of individuals, families, and communities, function and status of community mental health centers.

5420 Principles of Community Mental Health II (3) A continuation of 5410 with emphasis on recognized and developing approaches to mental health promotion and maintenance.

5430 The Adult and Mental Health (3) Coping and adjustment problems commonly experienced from post adolescence through middle adulthood; nursing approaches to the alleviation of mental health problems of both institutionalized and noninstitutionalized adults will be explored and analysed.

5550 Nurse Practitioner Fieldwork I (6) Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5240-50-60.
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 the staff and facilities of this laboratory into the mainstream of full-time graduate study in the life sciences. The school in order to meet this requirement is recommended that deficiencies in meeting entrance requirements should be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to: Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM

Requirements for the Ph.D. degree are:
1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology (5180-90); Mammalian Physiology (5200) and Statistics for Biologists (5740).

2. Three quarters of Biomedical Sciences Laboratory 5310-20-30-40.
3. Participation in Biomedical Sciences Seminar (5350-60-70) for one year.
4. Participation in at least one of the seminar courses (6110-70) during each quarter of residence after the first year is strongly recommended.
5. Satisfactory completion of formal advanced courses in the areas of the student's interests. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.
6. Pass both written and oral examinations.
7. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course 6000 is required.
8. A final oral examination on the dissertation.
9. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and as space is available.

Requirements for the M.S. degree are:
1. Graduate credit or a proficiency in the following core courses: Biochemistry (5110-20); Cell Biology I (5180); Cell Biology II (5190); plus any three of the following four courses: Biophysics (5140); Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.
Full-Time Faculty

Professors:
D. Billin, Ph.D. Tennessee; D. E. Olins, Ph.D. Rockefeller.

Associate Professors:
F. H. Gaertner, Ph.D. Purdue; F. D. Hamilton, Ph.D. Pittsburgh.

Assistant Professors:
N. W. Revis, Ph.D. Glasgow, Scotland.

Research Assistant Professor:
G. T. Hadden, Ph.D. Washington.

Shared Faculty

Not all faculty listed are necessarily available in teaching and/or research roles in the Biomedical Sciences.

Courses

The courses below are not necessarily taught every year.

5000 Thesis

5070-80 Physical Chemistry for the Life Sciences (3) Thermodynamics, phase equilibria; chemical equilibria; electrolyte surface chemistry, electrolyte solutions, kinetics, conduction, viscosity, diffusion.

5110-20 Biochemistry (3) Chemistry of carbohydrates, lipids, proteins, nucleic acids, and coenzymes; enzyme kinetics; intermediary metabolism and photosynthesis; biosynthesis of amino acids, purines, pyrimidines, lipids, and macromolecules. Coreq: 5070-83.

5140 Biophysics (3) Energy levels and excited states of large molecules; optical instrumentation; adaptations to system perturbations; properties of macromolecular solutions; molecular conformations; inter- and intra-molecular forces; physical principles of microscopy. Prereq: 5070-40.

5150 Genetics (5) Mendelian genetics, mitosis and meiosis. Genetics of phage, bacterial and eukaryotic organisms. Mapping and linkage; mutagenesis; cytoplasmic inheritance; mechanism of recombination; chromosome structure, replication, and segregation.


5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of eukaryotic cells. Pertinent instruments and techniques; analysis of organelles of eukaryotic cells. Permitted to cellular differentiation. Emphasis on differentiation of gene action and regulation of protein synthesis that are pertinent to cellular differentiation. Prereq: 5120, 5170.

5190 Cell Biology II (3) Comparative biochemistry and biophysical principles relevant to the determination of size, shape and molecular weight of biological macromolecules. Discussion of optical activity and light scattering by macromolecules in solution. Coreq: 5110, 5120.

5200 Mammalian Physiology (4) Survey of mammalian organ systems and their functions. Nervous, muscular, endocrine, digestive, respiratory, circulatory, reproductive, and excretory systems will be included; interrelationships of these systems and the role of cellular differentiation in these interactions in contemporary biological research. Prereq: 5190.

5230 Biochemical Concepts in Medical Sciences (3) Biochemical mechanisms involved in physiological conditions and pathological processes of human body. Dynamic functions of enzyme systems; biocatalysis of pharmaceuticals; hormone actions; neurobiology. Emphasis is placed on current biochemical advances in basic and clinical medicine. Prereq: 5200, 5110-20.

5310-20-30-40 Biomedical Sciences Laboratory (3 3 3 3) Laboratory courses designed to acquaint students with both the approaches and techniques in the various areas of modern biology. Students will spend a quarter in each of three or four laboratories conducting research on different areas of modern biological science. Required of all first-year students.

5350-40 Biomedical Sciences Seminar (1 1) Critical analyses of current journal publications in a selected area of modern biology. Written evaluation of papers and weekly oral presentations by each student. Required of all first-year students.

5370 Biomedical Sciences Seminar (1) Basic principles of scientific writing. Research articles, grant and thesis proposals, abstracts, review articles, progress reports. Required of all first-year students.

5430-60-80 Graduate Research Participation (3 6 8) Special research project covering an area not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

5519-20-30 Special Topics in Biomedical Sciences (3 3 3) Given either as tutorials or as formal lectures. Potential topics for such courses include x-ray diffraction and crystallography; excited-state biophysics; physical chemistry of macromolecules; computer science; pathology; cytology and cyogenetics; mammalian genetics; human genetics; cancer research; plant physiology; radiation biology; aging research. Additional courses can be developed to meet the interest of any subject of mutual interest to individual students and staff members. May be repeated.

5700 Developmental Biology (3) Principles of early embryogenesis and tissue interactions that initiate cellular differentiation. Emphasis on mechanisms of differential gene action and regulation of protein synthesis that are pertinent to cellular differentiation. Prereq: 5120, 5170, 5200.

5740 Statistics for Biologists (3) Application and interpretation of statistical methods in animal ecology. Randomization and randomization test; binomial and Poisson distributions, statistical presentation of data; estimation, testing hypotheses; confidence intervals; sample size, t-tests, analysis of variance, correlation and association; linear regression. Prereq: Introductory Statistics or consent of instructor.

5750 Experimental Design in Biomedical Research (3) Requirements for valid experiments; designs for the reduction of error, including paired comparisons, randomized blocks, and Latin squares; use of supplementary observations to reduce errors; randomization; investigation of several variables simultaneously by factorial and fractional factorial experiments; determining the number of observations. Prereq: 5740.

5800 Physical Biochemistry (3) Methods and concepts relevant to the determination of size, shape and properties of biological macromolecules. Discussion of optical activity and light scattering by macromolecules in solution. Prereq: 5070-20, 5110-20, 5140.

5840 Bioorganic Reaction Mechanisms (3) Nature of the chemical bond, nucleophilic and electrophilic reactions, molecular rearrangements, oxidation-reduction, synthesis, protein and nucleic acid modification reagents, reactions involving proteins and nucleic acids on polymer supports.
5680 Cryobiology (3) Physical and chemical responses of cells and tissues to low temperatures and ice formation. Relation of these responses to permeability, structure of semipermeable membranes, conformation of macromolecules, and the nature and state of water in cells; and how they bear on other fields of biology and medicine— including electron microscopy, photobiology, cell physiology, exobiology, ecology, and cryosurgery. Prereq: 5070-80 or equivalent, and 5130.

5920 Mammalian Genetics (3) Orderly presentation of known genetic variants affecting each of the organ systems of experimental mammals, especially the laboratory mouse. Prereq: 5170.

5940 Classic Experiments in Genetics (3) Original papers presenting new and lasting concepts in genetics will be read and discussed. Prereq: 5170.

6000 Doctoral Research and Dissertation.

6110 Seminar in Plant Physiology (1) May be repeated. Maximum 12 hrs. S/NC only.

6120 Seminar in Cellular and Developmental Biology (1) May be repeated. Maximum 12 hrs. S/NC only.

6130 Seminar in Genetics (1) May be repeated. Maximum 12 hrs. S/NC only.

6140 Seminar in Mammalian Research (1) May be repeated. Maximum 12 hrs. S/NC only.

6150 Seminar in Immunology (1) May be repeated. Maximum 12 hrs. S/NC only.

6160 Seminar in Biophysics (1) May be repeated. Maximum 12 hrs. S/NC only.

6170 Seminar in Biochemistry (2) May be repeated. Maximum 24 hrs. S/NC only.

6180 Advanced Seminar in Biomedical Sciences (1-3) Presentation, evaluation and discussion of current research in the various areas of the biomedical sciences, including cell biology, genetics, biophysics, and biochemistry. Prereq: Consent of instructor. May be repeated. S/NG 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. May be repeated. Maximum 12 hours. S/NC only. Prereq: Microbiology 4521 or equivalent and consent of instructor.

6200 Nucleic Acid Chemistry (3) Chemistry of nucleotide-derived materials covering topics including alkylation, solvolysis, oxidation-reduction, polymerization, synthesis, denaturation and other structure perturbants. The reaction of nucleic acids in the above systems will be examined with emphasis on the relationship of structure and reactivity. Prereq: 5110-20. Coreq: 5080.

6210 Protein Chemistry and Enzyme Mechanisms (3) Theoretical and practical aspects of protein chemistry including chemical and physical characterization of proteins, chemical modification of proteins, and structure-function relationships. The latter will emphasize enzymes and will include approximation of substrates, covalent catalysis, general acid-base catalysis, and strain and distortion of substrates. Prereq: 5110-20.


6240 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and the role of lipids in membranes, enzymic expression, and nervous tissue. The main emphasis is on lipid biochemistry of mammals, although comparative aspects, particularly the lipid pathways in bacteria and yeast are also described. Prereq: 5110-20.


6260 Advances in Animal Virus Research (3) Mechanisms of infection, replication, and maturation; alternations of host cell structure and function; host immunological responses; oncogenesis; pathogenesis; genetics; interferon. Prereq: 5110-20, 5180-90.

6270 Viral Carcinogenesis (3) History of viral oncology and descriptive catalog of tumor viruses. The 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) Course will include basic mechanisms in chemical and radiation mutagenesis and dosimetry in a variety of systems including bacteria, fungi, Drosophila, and mice.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Emphasis on current and future research developments. Offered on the topics listed under the Special Topics Courses and can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.
Graduate School of Library and Information Science

Gary R. Purcell, 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 objective of the program is to prepare responsible and competent individuals to assume a professional role in libraries and information centers in society and the processes by which knowledge is communicated through the medium of the graphic record. Students acquire a familiarity with the bibliography and the literature of various subject fields. They are expected to develop the ability to evaluate and use various types of print and non-print materials. Students are also introduced to current concepts of the management of library operations and services.

PROGRAMS OF INSTRUCTION

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 21 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis program is available, with 9 hours allowed for thesis credit. At least 36 hours must be taken in the GSLIS, allowing up to 15 hours outside the school. Upon completion of the program, all students are subject to an examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination. Programs are designed for persons interested in school libraries, public libraries, academic libraries, information science/technical information service, and library management.

ADMISSION REQUIREMENTS

The minimum grade point average for admission to the Graduate School is 2.5. Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the aptitude test of the Graduate Record Examination. The test should be taken at least one quarter in advance of application for admission to the Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language.

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

Arrangements made with the University of Tennessee Libraries provide a work-study plan for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students are expected to work at least 20 hours each week and to extend the period required for the degree to approximately two years.

Similar arrangements exist with some of the other libraries in the Knoxville area. A limited number of graduate assistantships are available through the School for the degree. Assistantships of this type carry a waiver of tuition and fees as well as a stipend, and require that recipients work 10 hours per week in the School.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

Faculty

Professors: E. E. Mauldin, M.S.L.S., Illinois; G. R. Purcell (Director), Ph.D., Case Western Reserve.

Associate Professors: G. E. Estes, M.S.L.S., Kent State; W. Robinson, Ph.D., Illinois.

Assistant Professors: J. Knightly, Ph.D., Texas; J. M. Pemberton, Ph.D., Tennessee; G. M. Sinkenkas, Ph.D., Pittsburgh; P. Wilson, Ph.D., Michigan.

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 the school library; relationship to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.

4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections.

4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries.

4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750.)
5000 Thesis

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

5110-20-30 Problems in Library Science (3, 3, 3) May be repeated with consent of the school.

5140 Research Methods in Library Science (3)
Research methods applicable to librarianship. Emphasis on the process and conduct of research; includes analysis of published research.

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)
Study and use of English and non-English literature and bibliographical sources in education, economics, political science, history, geography, anthropology, psychology, and sociology; emphasis on organization of collections for optimum use. Prereq: 5200.

5220 Sources and Services for the Natural Sciences (3)
Use of English and non-English literature and bibliographical sources in mathematics, physics, astronomy, chemistry, geology, biology and medicine; emphasis on organization of collections for optimum use. Prereq: 5200.

5230 Sources and Services for the Humanities (3)
Use of English and non-English literature and bibliographical sources in literature and language, fine arts, music, philosophy and religion; emphasis on organization of collections for optimum use. Prereq: 5220.

5240 Organization of Library Collections II (3)
Construction and maintenance of the library catalog as a retrieval instrument, including indexing and subject analysis theory, comparative classification with emphasis on the Library of Congress system, and problems in reclassification. Prereq: 4270.

5250 Government Publications I (3)
The acquisition, organization, and utilization of federal, state, and local government publications, publications of Congress, executive branch agencies and the Federal courts as well as government research and development report literature.

5260 Government Publications II (3)
Acquisition, organization and utilization of the publications of foreign governments and international organizations such as the United Nations, UNESCO, and others.

5270 Legal Bibliography (3)
Introduction to the literature of Anglo-American jurisprudence. Emphasis on use of reports, statutes, administrative regulations and decisions, treatises, periodicals, and indexes as bibliographic tools.

5300 Library Management (3)
A basic overview of management and organization concepts applicable to libraries and librarians.

5310 Library Systems and Services (3)
National, state, and regional systems of library service with attention to organization and planning, staff utilization, service standards and evaluation, and problems of jurisdictional relationships brought about by organizational patterns in multifunction public service systems.

5320 Library and Information Networks (3)
National and regional information systems will be examined. Primary attention will be given to the design and analysis of existing systems within the academic or special library sphere.

5330 Academic Libraries (3)
Discussion of persistent and current problems. Topics vary depending upon needs and interests of the group.

5350 School Libraries (3)
Discussion of persistent and current problems. Topics vary depending upon needs and interests of the group.

5360 Technical Libraries and Information Centers (3)
Purpose, functions and organizational characteristics of those libraries and information centers, private and public, which offer scientific and technical information services. Problems related to the acquisition, organization and servicing of technical information collections.

5370 The Library in the Community (3)
Public library as a social agency; its role in the education and communication systems of the community.

5380 Seminar: Academic, Public, School or Special Libraries (3) Prereq: Consent of instructor.

5400 Library Facilities (3)
Problems inherent in the planning and construction of libraries. Examination of the interrelationship of staff, materials and user space requirements.

5500 Principles of Materials Selection (3)
Philosophy and practice of building library collections in the light of library objectives.

5510 Multimedia Resources of Libraries (3)
Selection, acquisition, processing, storing, and servicing nonbook materials, with special attention to films, recordings, microforms, photocopying.

5520 History of Books and Printing (3)
Development of the book in its various forms. History of the 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 the acquisition, collection, preservation, and utilization of rare books and archival materials.

5600 Reading Guidance for Children and Young People (3)
Organization to meet needs, interest, abilities of different age and socioeconomic groups. Prereq: 5640 or consent of instructor.

5610 Mass Communications and the Library (3)
Mass media of communication in terms of their relation to modern library service, considered as forces that influence what people read, see, and hear.

5620 Traditional Literature and Oral Narration (3)
Fundamental principles of the art of storytelling including 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 Instructional Services 5691.)

5700 Automation of Library Processes (3)
Analysis of the 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)
Survey of the content and method of information science with emphasis on the application of research findings to general library practice.

5720 Information Systems Analysis and Design (3)
Elements involved in the design and operation of information retrieval systems, including acquisition, indexing, vocabulary, information representation, file organization, search procedures, and system evaluation.

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing the performance of systems to arrive at generalizations with respect to the theory, design and operation of IR systems.

5799 Practicum (6 or 9 or 12)
An opportunity to translate library theory into practice under the guidance of qualified librarians. Prereq: Completion of the 21-hr core curriculum plus approval of the director.
The Graduate School of Planning offers a two-year graduate course leading to a degree of Master of Science in Planning.

The purpose of study is the education of professional planners, competent to handle positions of increasing technical and administrative responsibility. Graduates are candidates for professional service in regional, city, county, and metropolitan area planning agencies, in local, state, and federal agencies concerned with physical, economic and administrative planning, in private businesses and organizations dealing with urban problems, and in private consulting practices.

The curriculum is organized on a basis of six quarters, or 72 credit hours, and provides the student with core courses in planning theory, methods, and techniques, and also takes advantage of offerings at The University of Tennessee in related fields such as government, 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. The purpose of this is to serve the needs of those planners now in the field who wish to acquire their professional degree but who can spare only the minimum amount of time from their jobs because of financial or family considerations.

Entering students follow a program of courses which provides education in the basic elements of planning. These include studies in theory, history, analytical methods, and legislation, as well as related courses in government, geography, sociology, and economics. Students in the latter quarters of the first year, and in the second year, are permitted to pursue particular interests through the choice of electives approved by the Graduate School of Planning.

Practice in research and analysis on a particular planning problem or topic is obtained through the preparation of a thesis or major study option. Core planning courses are taught by the faculty of the Graduate School of Planning. Related courses are taught by other specialists drawn from the University faculty. In addition, the services of experienced professional planners in TVA and other public and private organizations are called upon to broaden the scope of the students' understanding. A variety of outside speakers and seminar leaders provide insight into particular problems of significance to planners.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Both letters should be from teachers familiar with the applicant's undergraduate record, or where applicable, graduate academic record. In the event the applicant has had planning experience, a third letter is required from a supervisor or other person familiar with the planning work of the applicant. All applicants who wish to be considered for financial assistance from the University or the Graduate School of Planning should also submit recent Graduate Record Examination scores for the Aptitude (verbal and quantitative) portion of that test. Applicants are also requested to submit a statement of career goals in support of their application.

Applications will be acknowledged upon receipt. The applications will then be held by and reviewed in the Graduate School of Planning. The applicant should not anticipate an immediate response in regard to admissibility. Applications will be held until mid-April. Recommendations will then be made to the Graduate Office regarding the applicant's admission status. The Graduate School will then notify the applicants whether they have been admitted to the University and under what conditions the admission has been made.

All inquiries concerning admission should be addressed to: Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37916.

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit including at least 36 hours at the 5000 level or above.

Each student will be required to demonstrate competence in individual research. This may take either of two forms.

Plan I—Complete a thesis for 9 hours credit

Plan II—Complete a major study with acceptable documentation. In order to be eligible for the major study the student must have earned a grade of B+ or higher in Research Methods II, have a 3.5 cumulative grade point at the time of approval of the major study proposal, and have completed at least 24 hours of graduate study. The student meeting these criteria may present a proposal for a
major study which will include at least 9 hours of elective course work in an area of concentration. The proposal shall justify the area of study, the approach to the study, and the method of final documentation. Approval of the documentation, which must include written documentation, is a prerequisite for graduation.

Students in the Graduate School of Planning will be given a comprehensive written examination after approximately four quarters of course work. In addition to testing the knowledge of the student, the information thus obtained will be taken into account in advising students concerning the study program they should undertake during the balance of their academic program to remove any indicated deficiencies.

Each student will be encouraged, but not required, to complete a work-internship equivalent to at least two and one-half months of full-time work in a planning agency at approximately the midpoint in course work.

Faculty

Professors:  

Associate Professors:  
J. A. Spencer, M.C.P. Ohio State; R. L. Wilson, M.R.P. North Carolina.

Assistant Professors:  

Courses

4100 Introduction to Planning (3) History of planning, familiarization with the operations of contemporary planning, the concept of systems, current trends and issues. Emphasis on the relationship between planning and the society in which it occurs.

4200 Planning Communications (1) Graphic, oral and written communication of information and recommendations.

5000 Thesis

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

5100 Theory of Planning (4) Analysis of the means and objectives of the planning process. Emphasis on the role of the planner and the planning function in public decision making. Prereq: 4100.

5130 Planning Research Methods I (3) Research techniques in subject areas associated with city and regional planning. Research tools, data collection, analysis and projection as a basis for planning and decision making. Coreq: 4100 or consent of instructor. (Same as Water Resources Development 5130.)

5135 Planning Research Methods II (3) Application of rigorous investigation techniques in solving planning problems, including the use of statistical analysis and mathematical models. Urban and regional information systems as a resource and tool in problem identification and solution. Prereq: 5130.

5160 Planning and Utilities (3) (Same as Environmental Engineering 5160.)

5230 Urban and Site Design (2) Principles of design of small areas such as residential subdivisions, shopping centers, institutional complexes, central business districts. Brief examination of the problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience. Fees. Prereq: 5270.

5270 Planning and Transportation (2) (Same as Civil Engineering 5270.)

5280 Planning Methods (5) Tooling up studies; methods for preparation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5130.

5300 Regional Planning (3) Making the planning process operative in an intergovernmental context. Theoretical and administrative aspects of state planning, area planning, regional planning by state, single-purpose agency planning, and the TVA. Prereq: 5100.

5310 State Planning (3) Evolution of the planning function in state government, with emphasis on the institutional environment in which planning occurs. Context and scope of state planning, and the relationships with other branches and levels of government. Prereq: 5100.


5350 Urban Spatial Structure (2) An examination of past, present, and possible future patterns of urban spatial structure as determined by changing technology, interaction patterns, and socio-economic environment, drawing on contemporary theories, models, empirical research. Prereq: Consent of Instructor.

5360 New Towns (2) Historical development of planned new towns and implications for a national urbanization policy in the United States; the process by which new towns are being created, from the establishment of objectives to administration of the development process and the provision of public services; organizational alternatives for new town planning, development and management in the context of past experience and future objectives. Prereq: 4100, and consent of Instructor.

5380 Housing (2) The nature and the demand for housing in the U.S. and abroad with emphasis on the U.S. experience. The private market processes and public influences. The problems of change in the housing supply, impact of new technology, and governmental programs designed to improve the supply and quality of housing are emphasized. Coreq: 4100 or consent of instructor.

5410-20-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. These courses may be repeated for credit. Prereq: Consent of instructor.


5450 Urban Renewal (2) The use of urban renewal as a device for rebuilding the central city. Programming in relation to the general plan and budget. Familiarization with techniques and procedures insofar as is necessary to gain insight into major problem areas. Prereq: 4100.

5500 Synthesis (9) Problem-oriented experience designed to integrate knowledge from
Graduate School of Social Work

Ben P. Granger, Dean
Betty J. Cleckley, Assistant Dean
Ronald K. Green, Director, Continuing Social Work Education
David P. Fauri, Branch Director, Nashville
Roger M. Nooe, Branch Director, Knoxville
Kate Mullins, Branch Director, Memphis

The University of Tennessee School of Social Work is a fully accredited two-year graduate professional school, with a program (thesis or non-thesis option) leading to the degree of Master of Science in Social Work. The full two-year curriculum is offered in all three branch locations.

GRADUATE PROFESSIONAL EDUCATION

The goal of graduate professional social work education is the education and training of personnel for leadership roles in the social welfare community and in the social work profession. Leadership roles include those in social welfare management and administration, social planning, social policy development, and research. Social treatment leadership roles include treatment team leaders, consultants, supervisors, and expert practitioners.

In order to help reduce and eliminate such basic social problems as poverty, racism, crime, social injustice, and ill health, both educational and social welfare service organizations must focus on preventive as well as restorative objectives and functions.

The School of Social Work's curriculum provides a core program and two areas of specialization: social work treatment, and social welfare administration and planning. The two-year or six-quarter professional courses focus on the social student with the basic components of professional competence through a progression of course work and supervised practice experience.

At the professional level, practice is the individual's capacity for self-awareness and self-discipline and a commitment to the values and goals of the profession. The student must be able to think independently and analytically in order to use the skills and knowledge for purposeful and effective intervention at all societal levels.

THE PROFESSIONAL CURRICULUM

The curriculum offered during the first two quarters of the first year, the Core Curriculum, is required for all students. This Core Curriculum is designed to provide students with knowledge and skills that are common to social work practice at the treatment and at the administration and planning levels of intervention. The Core Curriculum also provides students in social work treatment with knowledge and skill about administration and planning and vice versa. The Core Curriculum is composed of the following units: (1) human behavior and social environment, (2) social welfare policy and services, (3) research, (4) social work practice, (5) field instruction. Human behavior and social environment courses focus on community structure and process, systems theory, culture and ethnicity, role theory, small group theory, personality theory, the family, and social deviance. The social welfare policy and services courses focus on the social work profession's interest in the analysis and formulation of contemporary social policy, and the analysis of organizations that implement policy and deliver services. The research courses focus on methodology as applied to problems in social welfare. Social work practice courses, which may include a skills laboratory, focus on interviewing, formulating objectives, observing and reporting behavior, managing group discussion, and other practice skills.

Field instruction is a practicum that provides students with experience in a social welfare agency or program. At the beginning of the third quarter of the first year, the student selects a specialization—social work treatment or social welfare administration and planning. Students are required to take 12 credit hours in their specialization. Students may take electives in the other specialization.

The first-year curriculum is on a concurrent class and field plan, with students participating in the classroom study program two or three days per week and spending two days in field instruction in a social welfare agency.

In the second year, students are involved full-time in classroom courses during the fall quarter, and in a block field placement in the winter and spring quarters with at least one concurrent classroom course per quarter.

The availability of second-year field placements in social agencies in principal cities in Tennessee and in areas immediately adjacent to the state enables the student to have some choice as to field instruction assignments.

The School of Social Work recognizes and accepts the cultural pluralism of society and seeks to prepare the student for practice through the planned inclusion of significant and pertinent racial and ethnic content throughout the curriculum. Such knowledge and its application should provide the student with the educational background to take a creative and objective role in the efforts of the social work profession toward the elimination of racism, poverty, and other social ills.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, 204 Lake Ave., Knoxville, Tennessee 37916.
ACCELERATED PROGRAM

The University of Tennessee School of Social Work has a special accelerated program which enables eligible candidates to complete the M.S.S.W. degree in twelve consecutive months. 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.

The twelve-month program begins in June in the Nashville Branch only with an intensive ten-week term from which students progress to the fall into the regular second-year curriculum. Application for admission to the Accelerated Program is through the regular admissions process. Applications should be filed no later than January 31 for the year in which admission is desired.

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-fifths 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 examination.
3. Personal qualifications acceptable for admission to the professional practice of social work.
   - Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed no later than March 1 for the year in which admission is desired.

DEGREE REQUIREMENTS

1. Satisfactory completion of the curriculum.
2. All courses taken as part of the degree programs, whether taken within the School of Social Work or outside, must be acceptable for graduate credit, relevant to social work and to the student’s career objectives, and have the approval of the student’s faculty advisor.
3. Achievement of a B average on all work presented for the Master’s degree.
4. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
5. Students who elect a non-thesis option must pass a written comprehensive examination.
6. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.
7. The maximum number of credit hours required for a degree shall be 72 hours including a maximum of 36 S/NC hours.

PART-TIME STUDENTS

Courses in the regular curriculum of the School are open to persons who meet the admission requirements for full-time study and who are planning to complete the work for the degree within the next two or three years. Application should be made to the School in the regular way, but the applicant should inform the Director of Admissions of the wish to begin part-time study on a planned basis.

TRANSFER CREDITS

Courses completed in another accredited school of social work are usually accepted for The University of Tennessee School of Social Work degree requirement providing the applicants meet the admission requirements of the Graduate School and The University of Tennessee School of Social Work, and if previous courses are equivalent to required or elective courses offered here. The University of Tennessee School of Social Work allows a maximum of 45 credit hours of graduate course work taken at another accredited institution to be transferred into the student’s Master’s program. Such work must have been taken for graduate resident credit and passed with a B or better. In addition, it must be part of an otherwise satisfactory graduate program (B average) and be approved by the branch director and the dean. This course 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.

Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the School of Social Work and the student’s major professor.

The Core Curriculum

The core curriculum is essentially the same for all students.

Credit Hours

Fall Quarter, First Year
5070 Social Work Research I ........ 3
5110 Social Welfare Policy and Services I ........ 3
5210 Human Behavior and Social Environment I ........ 3
5410 Social Work Practice I ........ 3
5910 Field Practice ........ 3
TOTAL QUARTER HOURS ........ 15

Winter Quarter, First Year
5080 Social Work Research II ........ 2
5120 Social Welfare Policy and Services II ........ 3
5220 Human Behavior and Social Environment II ........ 3

Spring Quarter, First Year
5420 Social Work Practice II ........ 3
5920 Field Practice ........ 4
TOTAL QUARTER HOURS ........ 15

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.

Spring Quarter, First Year
5930 Field Practice ........ 4
Specialization Courses and Electives ........ 10
TOTAL QUARTER HOURS ........ 14

Fall Quarter, Second Year
5940 Field Practice ........ 8
Specialization Courses or Electives. 2 or 3
TOTAL QUARTER HOURS ........ 10 or 11

Winter Quarter, Second Year
5950 Field Practice ........ 8
5961 Integrative Seminar ........ 2
One Elective ........ 2 or 3
TOTAL QUARTER HOURS ........ 12 or 13

AREAS OF SPECIALIZATION

A specialization is a focus within the student’s program involving intensive study, through class and field instruction. The University of Tennessee School of Social Work offers specializations in the following areas:

Social Work Treatment

Social work treatment deals with those individual, family, and group methods utilized to enhance the social functioning of individuals and effectively ameliorate problems of social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methodology basic to varied 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.

Preparation for Fields of Practice

Within the curricular specializations described above, the School offers opportunities for preparation for careers in fields of social work practice such as the following: corrections, including work with children and adults in courts, correctional institutions, and in probation and parole; family and child welfare services in public and voluntary agencies; group services in neighborhood and community centers; health services, including work with individuals and groups.
in programs of health and medical care in public health departments, hospitals, and clinics; and consultation and training, including work with individuals and groups in clinics, schools, and hospitals; public welfare services, including economic assistance and family services; mental health services, including individuals and groups in mental health programs including comprehensive mental health clinics, traditionally-oriented psychiatric clinics, and hospitals; rehabilitation services in a variety of settings to individuals with medical, psychiatric, and social disabilities; school social work with children and their families concerning school-related problems; social gerontology, individual and group services to the aging in a variety of settings.

Faculty

Professors:

Associate Professors:

Assistant Professors:

Courses

5000 Thesis

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

5079 Social Work Research I (3) Examination of research methodology as applied to problems in social welfare. Consideration is given to problem formulation; development of research design; instrument construction; data collection, analysis, and presentation; and report writing.

5080 Social Work Research II (2) A continuation of Social Work Research I.

5081 Evaluative Research in Social Work (2-3)
An advanced research course. Topics will include the design, review, and application of evaluative research, research design and methodology appropriate to evaluative research; the utilization of research findings. Prereq: Completion of core or consent of instructor.

5082 Practicum in Social Work Research (3-9) Supervised application of research methods and tools to a social welfare program. Program may be generated by faculty, students, or community organizations. Prereq: Completion of core or consent of organization. Prereq: 5079-90 and consent of the faculty member conducting the investigation. S/NC only.

5083 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 12 hrs.

5090 Special Problems in Social Work (2-9) Individual study or research on problems of special significance to the student's program, under supervision of the major professor. May be repeated.

5110 Social Welfare Policy and Services I (3) The focus is on the interests of the social work profession in the transformation of contemporary social policy at the local, state, national, and international levels of organization. Examination of the contribution of social work professionals to the formal policy-making process through which macro-social change is effected and the aggregate social welfare services are proposed, authorized, financed, and programmed. Policy lab may be used to focus on beginning skill development.

5120 Social Welfare Policy and Services II (3) An examination of theories of complex organizations as applied to social welfare services in various settings. The transformation of collective social welfare resources into divisible and indivisible social welfare benefits through organized instrumental action of a professional nature.

5130 Social Policy Analysis (2-3) "Policy science" techniques are considered for their appropriateness in social, political, and economic implications of social policy proposals. Prereq: Completion of core or consent of instructor.

5161 Social Welfare Seminar (2-3) A problem area or field of practice seminar using substantive knowledge about a social problem or condition and the interrelationships among problem definition, social policy, social welfare program, and social work practice. Fields such as health, mental health, child and family welfare, mental retardation, education, corrections, housing, labor force development, income maintenance, and aging may be examined. Laboratory Maximum 8 hrs. Prereq: Completion of core or consent of instructor.

5170 Human Behavior and Social Environment I (3) An examination of theories pertaining to the individual, family and small group within the context of their functions, structures, roles and processes. Behavior of these systems are conceptualized along a functional-dysfunctional and normal-deviant continuum. Organizing themes are stress, development and maturation, adaptive and defensive mechanisms. An open system approach is used to understand the interrelationship of biological, psychological, and social variables with emphasis on the implications of culture and ethnicity.

5171 Human Behavior and Social Environment II (3) The continuity and development of the student's knowledge of the range of adaptive behavior; continuum of behavior from optimum social functioning through pathology. Prereq: Sec-ond-year status. May be repeated.

5172 Imaginative Perspectives on the Human Condition (3) Examination of the usefulness to social work students of prose, drama, and poetry, which may illuminate and expand the knowledge and appreciation of every person's humanness. Adaptive and maladaptive response to crisis, situational, dramatic, and symbolic, and events, as portrayed by creative writers, are considered. The artistic representation of the essence of reality and spirit through the interaction of persons with one another and with society are analyzed. Prereq: Completion of core or consent of instructor.

5312 Psychopathology and Social Deviance (2-3) Deals with theories of and recent research in the etiology of psychiatric pathology and social variance. The theoretical approach to psychopathology will be examined and differentiated from abnormal behavior. Prerequisite: Completion of core or consent of instructor.

5313 Deviant Behavior of Children and Youth (2-3) An examination of deviant behavior and conduct disorders in children and youth, the etiology, symptomatic, and the range of social services and treatment modalities. Prereq: Completion of core or consent of instructor.

5314 Comparative Theories of Personality (2-3) Examines the personality theories with the most relevance for social work practice with individuals, groups, or families. Prereq: Completion of core or consent of instructor. Taught at branches only. Available at UTK as Psychology 4-514.

5315 Human Sexual Problems (2-3) Desensitization and desensitization of personal and social attitudes toward sexual behavior; clinical problems; workshops and approaches-oriented to make social workers better able to deal with clients with sexual problems. Prereq: Completion of core or consent of instructor.

5316 Mental Health and Employment (2-3) Explores work as a major life task and value, attitudes toward work, patterns of employment, effect of changing technologies on individual and community, interdependence of individual and organization, meaning of work in assessing mental health. Prereq: Completion of core or consent of instructor.

5410 Social Work Practice I (3) Basic theory, values and beginning skills development general to social work intervention at various system levels. Combines classroom skills and laboratory experiences.

5420 Social Work Practice II (3) Assessment, planning, methodology and skills development fundamental to social work intervention. Combines classroom skills and laboratory experiences.

5440 Family Therapy in Social Work Practice (2-3) Application of practice theory designed to assist in the acquisition of skills in the treatment of the family as a unit. Prereq: Completion of core or consent of instructor.

5441 Transactional Analysis (2-3) The philosophy, theory, and therapeutic technique of transactional analysis. Lecture, discussion, and experiential methods facilitate acquisition of the knowledge and skills to use transactional analysis as a treatment modality. Prereq: Completion of core or consent of instructor.

5442 Short-term Treatment (2-3) Considers the theory and practice of short-term treatment focusing on the nature of methods, characteristics of clients responsive to this approach, and designs of programs providing short-term treatment services. Specific techniques of assessment and treatment designed to practice with individuals in crises will be emphasized. Prereq: Completion of core or consent of instructor.

5443 Seminar on Behavior Therapy (2-3) Behavior modification methodology as applied to clinical assessment, choice of designs to
assess treatment interventions, skill in evaluating data on effectiveness of treatment intervention, and skills in diagnosis, intervention, and evaluation, and developing treatment modalities are examined. May be repeated. Maximum 6 hrs. Prereq: Completion of core or consent of instructor.

4530 Social Work Practice with the Poor (2-3) Explores casework, group work, and other methods of social welfare practice. Focuses on characteristics of poor populations and their interaction with the larger American society, with special attention given to poverty programs, and preventive strategies. Prereq: Completion of core or consent of instructor. This course may be repeated. Maximum 8 hrs.

4540 Social Work Practice with Individuals and Families (3) Explores individual and family therapy, and examination of the problems, issues, and dilemmas of practice in social services with the poor and the family. Prereq: Completion of core or consent of instructor.

4570 Comparative Methods of Group Treatment (2-3) Describes comparative analysis and critical review of the theory and methodology of some of the major group treatment modalities employed in the application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

4580 Social Work Practice in Rural Communities (2-3) Emphasizes the study of the organization and management of social service agencies in rural areas. Prereq: Completion of core or consent of instructor.

4590 Community Organization (2-3) Studies the theoretical and practical aspects of community organization and the role of the social worker in that capacity. Prereq: Completion of core or consent of instructor.

4610 Social Planning (2-3) Emphasizes the development of social welfare programs and the formulation of policy in the social planning process. Prereq: Completion of core or consent of instructor.

4620 Seminar in Social Welfare Administration (2-3) Explores the role of consulting social workers and administrative social workers in organizations and agencies. Prereq: Completion of core or consent of instructor.

4640 Social Work Practice for Marital Adjustment (2-3) Explores in terms of their essential concepts. Emphasis on differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor.

4570 Comparative Methods of Group Treatment (2-3) Describes comparative analysis and critical review of the theory and methodology of some of the major group treatment modalities employed in the application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

4580 Social Work Practice in Rural Communities (2-3) Emphasizes the study of the organization and management of social service agencies in rural areas. Prereq: Completion of core or consent of instructor.

4590 Community Organization (2-3) Studies the theoretical and practical aspects of community organization and the role of the social worker in that capacity. Prereq: Completion of core or consent of instructor.

4610 Social Planning (2-3) Emphasizes the development of social welfare programs and the formulation of policy in the social planning process. Prereq: Completion of core or consent of instructor.

4620 Seminar in Social Welfare Administration (2-3) Explores the role of consulting social workers and administrative social workers in organizations and agencies. Prereq: Completion of core or consent of instructor.

4640 Social Work Practice for Marital Adjustment (2-3) Explores in terms of their essential concepts. Emphasis on differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor.

4570 Comparative Methods of Group Treatment (2-3) Describes comparative analysis and critical review of the theory and methodology of some of the major group treatment modalities employed in the application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

4580 Social Work Practice in Rural Communities (2-3) Emphasizes the study of the organization and management of social service agencies in rural areas. Prereq: Completion of core or consent of instructor.

4590 Community Organization (2-3) Studies the theoretical and practical aspects of community organization and the role of the social worker in that capacity. Prereq: Completion of core or consent of instructor.

4610 Social Planning (2-3) Emphasizes the development of social welfare programs and the formulation of policy in the social planning process. Prereq: Completion of core or consent of instructor.

4620 Seminar in Social Welfare Administration (2-3) Explores the role of consulting social workers and administrative social workers in organizations and agencies. Prereq: Completion of core or consent of instructor.

4640 Social Work Practice for Marital Adjustment (2-3) Explores in terms of their essential concepts. Emphasis on differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor.
prepares the graduating student to assume positions of responsibility and leadership within the profession. The graduating student is helped to plan toward continuing his/her education and professional development. S/NC only.

5970 Outcomes in Social Work Practice (2-3) Application of substantive knowledge to comprehensive problem-solving within existing service and community systems. Critical appraisal of functional relationships between problem, policy, planning, practice, and outcomes. Examination of problems from practice to determine key elements of optimal services and implications for policy decisions. S/NC only.

5980 Practicum in Governmental Social Welfare Policy Making (2-3) Practical introduction to the process of legislative and/or administrative policy making at the state or local governmental level, through assignment of students to the offices of elected or appointed proximate policy makers. Limited social welfare policy research activities. Seminar used to present normative and descriptive theory about the policy-making process, and models of policy analysis. May be repeated. Prereq: Social Work 5110 and consent of instructor.
Index

Academic Calendar, 2
Accounting, 39
Activity Fee, 13
Adding Courses, 17
Administration, Graduate School, 6
Administration, University, 7
Admission, Examinations, 13
Admission, International Students, 12
Admission, Procedures, 12
Admission Requirements, 8, 9, 11
Admission to Candidacy, 19, 21, 22
Admission, Types of, 8, 9, 12
Adult Education, 52
Advertising, 48
Advisors, 17
Aerospace Engineering, 84, 86
Agriculture Campus, 4
Agriculture, College of: 24
Agricultural Biology, 26
Agricultural Economics and Rural Sociology, 25, 26, 27
Agricultural Engineering, 25, 27
Agricultural Extension Education, 28
Agricultural Mechanization, 28
Animal Science, 25, 28
Food Technology and Science, 29
Forestry, 30
Ornamental Horticulture and Landscape Design, 31
Plant and Soil Science, 26, 32
Veterinary Medicine, 24
Wildlife and Fisheries Science, 31
Agricultural Biology, 26
Agricultural Economics and Rural Sociology, 25, 26, 27
Agricultural Education, 62
Agricultural Engineering, 25, 27
Agricultural Extension Education, 28
Agricultural Mechanization, 28
Agriculture, Institute of: 24
Agricultural Experiment Station, 24
Agricultural Extension Service, 24
Animal Science, 25, 28
Anthropology, 103
Application, 11, 12
Application Fee, 11, 12
Arabic, 141
Archaeology, 105
Architecture, School of: 34
Arrowmont School of Crafts, 90, 92
Art, 106
Art Education, 51
Assistantships, 14
Astronomy, 133, 134
Audiology, 106
Auditors, 13, 17
Automobile Registration, 16
Average, Required, 17
Aviation Systems, 98
Bionics, 95
Biochemistry, 109
Biology, 110
Biology, Agricultural, 26
Biology, Radiation, 147
Biomedical Sciences, 11, 151
Black Studies, 117
Board of Trustees, 7
Botany, 110
Broadcasting, 48
Business Administration, College of: 35
Accounting, 39
Business Law, 39
Economics, 39
Finance, 41
Governmental Financial Administration, 42
Industrial and Personnel Management, 43
Management Science, 43
Marketing, 44
Office Administration, 44
Real Estate and Urban Development, 45
Statistics, 45
Transportation and Logistics, 44
Business and Economic Research, 38
Business Education, 62
Business Law, 39
Calendar for 1978, 2
Campus Map, 4, 5
Candidacy, Admission to, 19, 21, 22
Change of Program, 18
Change of Registration, 17
Chattanooga Engineering Program, 11
Chemical Engineering, 69, 70
Chemistry, 112
Child and Family Studies, 90
Civil Engineering, 72, 73
Classics, 115
Classification of Students, 14
Colleges:
Agriculture, 24
Architecture, 34
Business Administration, 35
Communications, 48
Education, 50
Engineering, 68
Home Economics, 89
Liberal Arts, 103
Nursing, 149
Committee, Doctoral, 22
Committee, Master's, 19
Communications, 47
Communications, College of: 46
Communications, 47
Advertising, 48
Broadcasting, 48
Journalism, School of, 48
Communications Research Center, 47
Comparative Literature, 116
Computer Science, 116
Computing Center, 16
Consumer Studies and Housing:
Public Policy, 89, 92
Continuing and Higher Education, 52
Continuous Registration, 22
Correspondence, 17
Correspondence Directory, 3
Council, Graduate, 6
Counseling, Vocational Rehabilitation, 59
Course Numbers, 18
Course, Drop, Add, 17
Crafts, Interior Design and Housing, 92
Credit, Graduate, 17
Cultural Studies, 117
Curriculum, 53
Curriculum and Instruction, 53
Cybernetics, 90
Deferred Payment Fee, 13
Degree Requirements, 17-23
Degrees Available, 8, 9
Dissertation, 22
Dissertation, Economics, 62
Doctor of Business Administration, 8-9, 22, 37
Doctor of Education Degree, 8-9, 22
Doctor of Philosophy Degree, 8-9, 22
Doctoral Committees, 22
Doctoral Languages, 22
Dropping Courses, 17
Ecology, 99
Economics, 39
Education, College of: 50
Administration and Supervision, 56
Agricultural, 62
Agricultural, 62
Art, 51
Business, 62
Continuing and Higher Education, 52
Curriculum, 39
Curriculum and Instruction, 53
Distributive, 62
Elementary, 53
English, 53
Foreign Language, 53
Guidance, 57
Health, 64
Home Economics, 62, 66
Industrial, 63
Instructional Materials, 53
Mathematics, 53
Music, 51
Physical, 66
Psychology and Guidance, 57
Public Health, 64
Recreation, 67
Safety Education, 65
School Health, 65
Science, 53
Social Science, 53
Special, 59
Vocational Rehabilitation Counseling, 59
Vocational-Technical Education, 61
Educational Administration and Supervision, 56
Educational Psychology and Guidance, 57
Educational Research and Service, 50
Electrical Engineering, 76
Elementary Education, 53
Engineering Administration, 66
Engineering, College of: 68
Administration, 68
Aerospace, 84, 86
Chemical, 69, 70
Civil, 72, 73
Electrical, 76
Environmental Engineering, 73, 75
Experiment Station, 68
Industrial, 82
Mechanical, 84, 85
Metallurgical, 69, 71
Nuclear, 87
Science, 80
Engineering Program, Chattanooga, 11
Engineering Science, 80
English, 118
English Education, 53
English for Foreign Students, 12
Entrance Requirements, 17
Environmental Engineering, 73, 75
Social Work, School of, 11, 158
Sociology, 143
Space Institute, 10
Spanish, 142
Special Education, 59
Specialist in Education, 8-9, 20
Speech and Hearing Sciences, 107
Speech and Theatre, 144
Speech Pathology, 107
Statistics, 45
Student Calendar, 2
Tennessee Executive Development Program, 38
Textiles and Clothing, 96
Theatre, 144
Thesis, 19, 21
Thesis Consultant, 19
Thesis Registration, 19
Time Limit, Programs, 18
Timetable of Classes, 3
Traffic Rules, 16
Transcripts, 3
Transfer Credits, 18
Transient Students, 12
Transportation and Logistics, 44
Trustees, Board of, 7
Tuition, 13
Unclassified Graduate Student, 12
University Administration, 7
University Calendar, 2
University International House, 16
University Program and Services Fee, 13
University Studies, 102
Vehicle Operation, 14
Veterans' Benefits, 15
Veterinary Medicine, 24
Vocational Rehabilitation Counseling, 59
Vocational-Technical Education, 61
Waiver of Fees, 14
Water Resources Development, 102
Wildlife and Fisheries Science, 30
Withdrawal, 13
Written Examination, 19, 21, 22
Zoology, 145