NOTE: Students receiving credit for 8790 prior to taking an Introduction to Advocacy course (8140 or 8150) will receive 3 hours credit for taking the Introduction to Advocacy course. Students receiving credit for 8790 after completing 8140 or 8150 will receive 2 hours credit for the Introduction to Advocacy course.

8240 Arbitration Seminar (3) Arbitration of labor agree- ments, judicial and legislative developments, nature of employer-employee relationship to collective bargaining, selected arbitration problems on various topics under state constitutions, and role of lawyers and arbitra- tors in the process.

8320 Constitutional Law Seminar (2) Current constitutional law problems. Original paper required. (Prereq. 8320.)

8345 Criminal Law Seminar (2) Advanced criminal law and administration of justice.

8390 Estate Planning Seminar (2) Contract-oriented estate planning, testamentary and inter vivos gifts, wills, trusts, inter vivos and testamentary gifts, and role of estate planning. Students receiving credit for 8390 prior to taking the Estate Planning Seminar course (8300) will receive 3 hours credit for taking the Estate Planning Seminar course. Students receiving credit for 8390 after completing 8300 will receive 2 hours credit for the Estate Planning Seminar course.

Prereq: 8300.

8320 Constitutional Law Seminar (2) Current constitutional law problems. Original paper required. (Prereq. 8320.)

8345 Criminal Law Seminar (2) Advanced criminal law and administration of justice.

8390 Estate Planning Seminar (2) Contract-oriented estate planning, testamentary and inter vivos gifts, wills, trusts, inter vivos and testamentary gifts, and role of estate planning. Students receiving credit for 8390 prior to taking the Estate Planning Seminar course (8300) will receive 3 hours credit for taking the Estate Planning Seminar course. Students receiving credit for 8390 after completing 8300 will receive 2 hours credit for the Estate Planning Seminar course.

Prereq: 8300.

8320 Constitutional Law Seminar (2) Current constitutional law problems. Original paper required. (Prereq. 8320.)

8345 Criminal Law Seminar (2) Advanced criminal law and administration of justice.

8390 Estate Planning Seminar (2) Contract-oriented estate planning, testamentary and inter vivos gifts, wills, trusts, inter vivos and testamentary gifts, and role of estate planning. Students receiving credit for 8390 prior to taking the Estate Planning Seminar course (8300) will receive 3 hours credit for taking the Estate Planning Seminar course. Students receiving credit for 8390 after completing 8300 will receive 2 hours credit for the Estate Planning Seminar course.

Prereq: 8300.

8320 Constitutional Law Seminar (2) Current constitutional law problems. Original paper required. (Prereq. 8320.)

8345 Criminal Law Seminar (2) Advanced criminal law and administration of justice.

8390 Estate Planning Seminar (2) Contract-oriented estate planning, testamentary and inter vivos gifts, wills, trusts, inter vivos and testamentary gifts, and role of estate planning. Students receiving credit for 8390 prior to taking the Estate Planning Seminar course (8300) will receive 3 hours credit for taking the Estate Planning Seminar course. Students receiving credit for 8390 after completing 8300 will receive 2 hours credit for the Estate Planning Seminar course.

Prereq: 8300.
or rulemaking to develop administrative policy, consistency in administrative action.

8930 Consumer Protection Seminar (2) Selected problems in consumer protection.

8935 Law and Medicine Seminar (2) Medical profession’s involvement in judicial process: (1) medical malpractice and alternatives to fault-based liability; (2) responsibilities for deposition and care of dead bodies and legal principles governing organ transplantation; (3) expert medical proof and testimony; (4) medical legal aspects of euthanasia; (5) more specific matters: legal import of medical profession’s various canons of ethics.

8935 Trade Regulation Seminar (2) Antitrust laws and laws applicable to regulated industries.

8960 Office Practice Seminar (2) Techniques of law office management, methods and practice techniques in preparation of various legal instruments, office accounting, interviewing and counseling, management of personnel.

8995 Land Acquisition & Development Seminar (2) Alternative business forms to prepare and present for seminar discussion. Major documents (notes, deeds, prospectus, etc.) necessary to accomplish acquisition or development of large pieces of raw land. Prereq: 8990.

COURSE OFFERINGS SUBJECT TO CHANGE

The necessity of adjustments to accommodate changing conditions may dictate modifications in the course offerings and other features of the program described above. Accordingly, the college reserves the right to make such variation in its program as circumstances may require. Prospective students who are interested in the precise course offerings at a given time or who desire other special information should make inquiry in advance.

It is necessary to offer some courses and seminars only on an every-other-year basis. Choice is based on subject matter and past patterns of student enrollment.
The College of Liberal Arts offers programs leading to eight advanced degrees. See page 9 for degrees and majors.

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.

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 research, 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.

Departments of Instruction

Anthropology

MAJOR

DEGREES

Anthropology

M.A., Ph.D.

Professors:

W. M. Blase (head), Ph.D. Pennsylvania; C. H. Faught, Ph.D. Indiana; R. L. Janey, Ph.D. Kansas; P. R. Panza, Ph.D. Texas A&M.

Associate Professors:


Assistant Professors:

B. A. Neath, Ph.D. Kentucky; J. F. Smith, Ph.D. SUNY-Binghamton; P. S. Willey, Ph.D. Tennessee.

Instructor:

M. A. Blase (part-time), Ph.D. Kansas State.

Research Associate Professor:


The Department of Anthropology offers the Master of Arts and the Doctor of Philosophy degrees with concentrations in physical anthropology, cultural anthropology, zoological and folk culture. Additional information may be obtained from the Anthropology Department.

THE MASTER'S PROGRAM

Requirements for the M.A. degree include:

1. Admission to the program through establishment of a program of study, including other requirements which are described in the departmental brochure.
2. Formation of an advisory committee, and in consultation with that committee, establishment of a program of study, including delineation of field(s) of competence.
3. No minimum credit hour requirement. Students should plan to devote no fewer than four years beyond the B.A. to attain the Ph.D.
4. Foreign language(s), statistics, or some other skill to be determined by the student's committee.
5. Written and oral comprehensive examinations.
6. Successful completion of the dissertation and final oral examination.

3070 Devotion and Society (3) (Same as Botany 3070)

3410 Principles of Cultural Anthropology (3) Basic concepts and objectives in study of culture. Range of cultural systems. Recommended prerequisite: Botany 2530. (Same as Religious Studies 3440) F or Sp

3440 Religious Beliefs of Primitive Peoples (3) Religions of primitive peoples. Place of religion in their social and cultural systems. Recommended prerequisite: Botany 2530. (Same as Religious Studies 3440) F or Sp

Robert G. Landen, Dean
Charles D. Jackson, Associate Dean
Paul Huray, Associate Dean for Research and Resource Development
Harry Jacobson, Associate Dean for Student Academic Affairs

The College of Liberal Arts offers programs leading to eight advanced degrees. See page 9 for degrees and majors.
3450 Community Studies in Complex Cultures (3) Review of cross-cultural comparative urban and rural communities, and selected case studies. Recommended prereq: 2530. A

3530 Peoples and Cultures of Africa (3) Ethnographi-
Cal study of selected African peoples and changing environ-
ments. Focus on anthropological methods and approaches. 
Prereq: 2520 or consent of instructor. May be repeated. 
Maximum 9 hrs. E

3550 Anthropology of the United States and Canada (3) Survey of prehistoric peoples north of Mexico from first European contact to European impact. Recommended prereq: 2530. F

3561 Anthropology of the United States and Canada II (3) Historic ethnography of Euro-American, Afro-American, and American Indian cultures in the United States and Canada from 15th to 20th centuries. W

3620 European Prehistory I (3) Cultural develop-
ments during Paleolithic, Mesolithic, and Neolithic. 
Recommended prereq: 2520. W, A

3620 European Prehistory II (3) Cultural develop-
ments during Neolithic and Bronze Age in Europe. 
Recommended prereq: 2530 and 3620 should be taken in sequence. W

3660 Prehistory of the Americas (3) Survey of prehistory from earliest human occupation to time of European contact. Prereq: 2520 or consent of instructor. A

3680 Priniciples of Archaeology (3) Archaeological pro-
cesses, theories, and methodologies. Basic concepts of prehistory. 
Prereq: 2530 and 3550. A

3710 Field Work in Archaeology (3-6) Fieldwork training projects. Prereq: 2520 and consent of instructor. 3 hrs and 1 lab. F

3740 Applied Cultural Anthropology (3) Applications of anthropological theory, methods and findings in programs of community and national development, public health, international aid, and military assist-
ance. Examination of the roles of anthropologists, questions of values and ethics in intervention schemes, issues of power and control. Prereq: 2520 or more advanced course. A

3740 Readings in Anthropology (1-3) Intensive read-
ing, problem-oriented course. Prereq: 2520, 2530, or consent of instructor. May be repeated. Maximum 9 hrs. E

4500 Field Work in Archaeology (3-6) Practicum work 
surveying, excavating, processing, and analyzing of data. Intensive reading. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs. E

4500 Cultural Ecology (3) Survey of concepts and methods of anthropological ecology, including the study of human relationships to physical, cultural, and social environments. Topics include ecological theory, methods of analysis, and application from selected case studies. Prereq: 2520, 2530, 3410 or consent of instructor. A

4520 Dynamics of Culture (3) Culture change, inno-
vation, diffusion and acculturation, cultural identity and stability. Prereq: 2520 or consent of instructor. W

4540 Urban Anthropology (3) Survey of theoretical and methodological issues anthropologists encoun-
ter researching cross-cultural urban settlements. Focus on anthropological perspective and urban problems and planning. Prereq: 2540 or consent of instructor. F

4560 Comparative Social Organization (3) Social organization theories, and practices of human societies. Prereq: 2520 and 3550. A

4600 Method and Theory in American Archaeology (3) Historical development of New World archaeo-
logic methods and techniques. Prereq: 2520 or consent of instructor. A

4610 African Prehistory (3) Survey of cultural history and prehistory of Africa, south of the Sahara, from earliest evidence of human presence to time of initial Euro-African contact. Prereq: 2520 or consent of instructor. A

4640 Zooarchaeology (3) Basic osteological studies of human and non-human remains. Focus on human subsistence and paleoecology, and contributions to archaeology. Prereq: 2520 or consent of instructor. F

4640 Comparative Social Organization (3) Social organization theories, and practices of human societies. Prereq: 2520 and 3550. A

4720 American Folklore (3) Anthropological perspec-
tives of folklore of geographical regions and ethnic 
groups of the United States. Prereq: 2560 or consent of instructor. A

4740 Southern Appalachian Folk Culture (3) Survey of cultural history and prehistory of southern Appalachia in relation to traditional culture, technology and economy, social organization, beliefs and values, and traditions, and customs. Prereq: Consent of instructor. A

4741 Research in Southern Appalachian Folk Culture (3) Research-oriented, wide range of traditional cul-
ture in the Southern Appalachians. Prereq: 4740. consent of instructor. A

5010 Graduate Research (1-9) Independent investiga-
tion of special problems in anthropological research. May be repeated. Maximum 9 hrs. A

5013 Independent Study (1-12) See page 104. A

5050 College of Liberal Arts/Antropology 105

5070 Thesis (1-15) FAP only. E

5100 Graduate Research (1-9) Independent investi-
gation of special problems in anthropology. May be repeated. Maximum 9 hrs. E

5100 Seminar in Cultural Anthropology (3-8) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

5101 Study of the United States and Canada (3) Ex-
amination of the roles of anthropologists, programs of community and national development, or consent of instructor. A

5102 Study of the United States and Canada (3) Ex-
amination of the roles of anthropologists, programs of community and national development, or consent of instructor. A

5103 Independent Study (1-12) See page 104. A

5140 Seminar in Archaeology (3-8) Approaches to analysis and interpretation of archaeological faunas. Intensive reading, evaluation and discussion of major faunal studies, guides to identification, methods of presenting faunal data. May be repeated. Maximum 9 hrs. A

5150 Laboratory Studies of the Mollusc (4) Ex-
amination and identification of terrestrial and freshwater mollusks of eastern U.S. Emphasis on living and archaeologically derived pelecypods. Prereq: 4640. 1 hr and 3 lab. A

5160 Seminar in Archaeology (3-8) Theoretical and practical issues central to contemporary archaeologi-
Cal. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

5160 Seminar in Archaeology (3-8) Theoretical and practical issues central to contemporary archaeologi-
Cal. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

5200 Historical Thought in American Archaeology (3) Intensive review of continuity and change in con-
temporary archaeology. Prereq: A

5201 Seminar in Archaeology (3-8) Theoretical and practical issues central to contemporary archaeologi-
Cal. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

5201 Seminar in Archaeology (3-8) Theoretical and practical issues central to contemporary archaeologi-
Cal. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

5210 Nutritional Anthropology (3) Anthropological 
biological variability in present and past populations. 
Prereq: 2520 or more advanced course. Recommended: Basic nutrition course. A

5220 Oral Traditions in America (3) Anthropological 
biocultural variability in present and past populations. 
Prereq: 2520 or more advanced course. Recommended: Basic nutrition course. A

5230 Independent Study (1-12) See page 104. A

5400 Ethnographic Research Techniques (2) meth-
ods of collecting, ordering, and utilizing data. Prereq: A

5400 Ethnographic Research Techniques (2) meth-
ods of collecting, ordering, and utilizing data. Prereq: A

5400 Ethnographic Research Techniques (2) meth-
ods of collecting, ordering, and utilizing data. Prereq: A

5400 Quantitative Methods in Anthropology (3) Ap-
plication of quantitative methods to anthropological data. May be repeated. Maximum 9 hrs. A
5470 The Healer in Cross-Cultural Perspective (3) Graduate seminar dealing with classification, meth-
ods of diagnosis, and therapeutic modes of healers. Prereq: Consent of instructor. W.A.
5510 Non-Western Education: Anthropological Approaches (3) Analysis of traditional educational
practices among non-Western peoples, problems from African and American Indian, Asian and
African tribal groups and Asian cultural practices. Prereq: Consent of instructor. May be repeated.
Max. 6 hrs. F.A.
5511 Education in Cultural Perspective (3) (Same as Curriculum and instruction 5110) F.
5600 Theory in Archaeology (3) Review of develop-
m ent of theoretical anthropology. Coverage up to and including recent systems approaches. F.
5610 Problems in North American Archaeology (3) Seminar to explore specific research problems in North
American archaeology. Research topics on prehis-
tory ecology and settlement patterns in North America. Prereq: Consent of instructor. May be repeated. Max-
imum 6 hrs. F.A.
5620 Problems in Old World Archaeology (3) Selected topics and research problems in European, Asian
and African prehistory investigated in depth. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Same as Classics 5620.
5840 Archaeological Resource Management (3) Theory and practice—public, conservation, contract, and sal-
vage/ground survey. Archaeology. Legislation, contracts, responsibilities, and authority. Selection and/or consent of instructor. Lecture and lab. F.A.
5850 Archaeology of Southeastern United States (3) Intensive study of prehistoric American Indian. Spec-
trum of methodologies. Prereq: 5000 or consent of instructor. W.A.
5860 Seminar in Prehistoric Lithic Technology (3) Analysis of techniques employed in manufacture of pre-
historic stone implements. Each student will analyze a set of artifacts using a variety of experimental and
documentation techniques. Prereq: Consent of instructor. F.A.
5870 Seminar on Aboriginal Lithic Resources (3) Topics will depend on current research interests. Prereq: consent of instructor. Lecture and lab. F.A.
5880 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting human
skeletal material. Roentgenological, histological, and gross visual examinations of skeletal material. Prereq: 5900 and/or consent of instructor. Lecture and lab. F.A.
5900 Dental Anthropology (3) Dental anatomy, theo-
ry of dental evolution, genetics and environmental
influences controlling dental morphology, compara-
tive studies of modern and fossil human populations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F.A.
5910 Measurement of Man (3) Techniques of measuring
and describing several systems and their relationship to health and disease. Prereq: Consent of instructor. F.A.
5920 Advanced Physical Anthropology (3) Intensive
theory and practice in physical anthropology.
5930 The Human Skeleton in Forensic Medicine (3) Application of physical anthropological princi-
ples to human identification. Determination of age, race, sex of skeleton and preparation of reports for legal
5940 Biohistory of Early Human Population (3) Practical and theoretical approaches to analysis of
genealogies, human skeletal populations. Demogra-
phy, biostatistics, pathology, nutrition, and measures of biological and cultural variation as they relate to pro-
pagation of early human populations. Prereq: 5930. F.
5950 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting human
skeletal remains. Prereq: previous anthropological training as adaptive unit. Prereq: Consent of instructor. W.A.
5960 Dermatoglyphics (3) Methods of dermatogly-
phic analysis: genes and population variation of various dermatoglyphic characters, forensic applica-
tions, relationships to various genetic and chromosomal abnormalities. Prereq: Consent of instructor. F.
5970 Modern African Man and Human Evolution (3) Mor-
phology, distribution, and evolutionary relationships of modern human populations. Prereq: 4970 or consent of instruc-
tor. W.A.
5990 Human Variation (3) Nature of human biological
variation with emphasis on microevolutionary processes
responsible for establishing and maintaining varia-
tions of human populations. Prereq: Consent of instructor. W.A.
6000 Doctoral Research and Dissertation (3-15) P.
6320 Seminar in Nutritional Anthropology (3) Analy-
tical survey of the nutritional anthropology literature. Prereq: 3220 and consent of instruc-
tor. W.A.
6310 Seminar in Cultural Anthropology (3) Seminar
is offered each quarter primarily for doctoral candi-
dates. Contact admissions office for information.
6410-30 Seminar in Cultural Anthropology (3,3) Seminar
in cultural anthropology. Prereq: 5220 and consent of instruc-
tor. May be repeated. Maximum 9 hrs.
6420-30 Seminar in Cultural Anthropology (3,3) Seminar
in cultural anthropology. Prereq: 5220 and consent of instruc-
tor. May be repeated. Maximum 9 hrs.
6510 Problems in Folk Culture Studies (3) Seminar
analyzing development of theory and method in Euro-
pean and American folk culture studies. Prereq: Consent of instruc-
tor.
6520 Problems in Folk Culture Studies (3) Topics to be selected dealing with major problems and aspects of
traditional and contemporary folklore. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
6580 Folklore (3) Detailed analysis of folklore and fol
cultural study of the traditional oral and written traditions, particularly in terms of folklore and cultural
homogeneity, par
ticular folk groups and their relations, subject areas and their popular appeal. Prereq: Consent of instructor. W.A.
6590 Dental Anthropology (3) Dental anatomy, theo-
ry of dental evolution, genetics and environmental
influences controlling dental morphology, compara-
tive studies of modern and fossil human populations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F.A.
6610 Measurement of Man (3) Techniques of measuring
and describing several systems and their relationship to health and disease. Prereq: Consent of instructor. F.A.
6620 Advanced Physical Anthropology (3) Intensive
theory and practice in physical anthropology.
6630 The Human Skeleion in Forensic Medicine (3) Application of physical anthropological princi-
ples to human identification. Determination of age, race, sex of skeleton and preparation of reports for legal
6640 Biohistory of Early Human Population (3) Practical and theoretical approaches to analysis of
genealogies, human skeletal populations. Demogra-
phy, biostatistics, pathology, nutrition, and measures of biological and cultural variation as they relate to pro-
pagation of early human populations. Prereq: 5930. F.
6650 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting human
skeletal remains. Prereq: previous anthropological training as adaptive unit. Prereq: Consent of instructor. W.A.
6660 Dermatoglyphics (3) Methods of dermatogly-
phic analysis: genes and population variation of various dermatoglyphic characters, forensic applica-
tions, relationships to various genetic and chromosomal abnormalities. Prereq: Consent of instructor. F.
6670 Modern African Man and Human Evolution (3) Mor-
phology, distribution, and evolutionary relationships of modern human populations. Prereq: 4970 or consent of instruc-
tor. W.A.
6700 Seminar in Human Paleontology (3) Prereq: 4970 or consent of instructor.
Archaeology—Greek and Roman
See Classics
Art
MAJOR DEGREES
Art
M.F.A.
Professors:
D. P. Kurka, (Head) Ph.D. New York; S. J. Sillitt,
M.F.A. Wisconsin; R. A. Geleris, M.S. Wisconsin;
J. T. Glittenberg, Ph.D. Chico State, J. S. Faletto, M.F.A.
Wisconsin; R. W. Verlinden, Ed.D. Illinois State;
M. B. Gronholm, M.F.A. Northern Illinois; G. A. Koster,
W. E. Luedtke, M.F.A. Tennessee; F. McAller, Ph.D.
Chicago; T. J. Roseng, M.F.A. Nebraska; G. Yair,
M.F.A. North Carolina (Greensboro); A. P. Young,
M.A. Columbia.
Assistants:
D. F. Haber, Ph.D. Michigan; A. New, Ph.D.
Bowling Green; C. J. Foster, M.F.A. Western Illinois;
S. Reynolds, M.F.A. Pennsylvania; R. P. Youn, M.F.A.
Iowa; C. F. Steward, M.F.A. Claremont.
Associates:
P. R. Brinker M.F.A.; J. W. H. Darnforth, M.F.A.
D. F. Heimpel, M.F.A.; S. H. Krueger, M.F.A.; P. C. Lauer,
M. B. Gronholm, M.F.A.; J. E. Kennedy, R. LeFevre,
M. B. Gronholm, M.F.A.; J. E. Kennedy, R. LeFevre,
M. B. Gronholm, M.F.A.; J. E. Kennedy, R. LeFevre,
M. B. Gronholm, M.F.A.; J. E. Kennedy, R. LeFevre,
M. B. Gronholm, M.F.A.; J. E. Kennedy, R. LeFevre,
M. B. Gronholm, M.F.A.; J. E. Kennedy, R. LeFevre,
5590 Projects in Law of Thesis (290) Prior grad- uate coursework and successful second year evaluation by the faculty.
Course offerings periodically at the Pr. Beta Phi Arrowmont School of Crafts, Gat- linburg, Tennessee. Courses may be repeated.
1059 Seminar in Art Criticism (1) Theory and prac- tice. Intended for majors in studio art.
1555 Graduate Ceramics II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp.
2500 Art Practice. Intended for majors in studio art.
2501 Art Practice. Intended for majors in studio art.
Art/College Of Liberal Arts
The intent of each major program is to provide the student with the scholarly and experimental design which enable the stu- dent to investigate problems pertaining to human communication processes; technical skills in instrumentation and experimental design which allow students majoring in the two areas 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 12 quarter hours of credit in the completion of an acceptable thesis representing original independent research. At least two-thirds of these total courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass the comprehensive examination. A mini- mum of 32 quarter hours must be at the 5000 level. The choice of the thesis or non-thesis program is normally made following completion of 5110 and 5119. 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 and language pathology, audiology, or speech and hearing sciences. 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 eural 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 disor- ders; 3. Related disciplines providing insight into human communication processes; 4. Technical skills in instrumentation and experimental design which enable the stu- dent to investigate problems pertaining to speech and hearing processes. The program will normally consist of three
Art and Audiology and Speech Pathology

DEGREES
Audiology and Speech Pathology

MAJOR CURRICULUM

Speech Pathology

Ph.D.

M.A.

Ph.D.

B.A.

M.A.

M.D.

M.A.

Associate Professors:

Audiology


A. D. Elliott, Ph.D. Washington; E. Hamey, Ph.D. Iowa.

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 in one field. For example, in the M.A. in Audiology program, a student may concen- trate in audiological assessment, habilitation-rehabilitation, medical or pediat- ric or industrial audiology. Within the M.A. in the Speech Pathology program, a student may concentrate in language disorders, cul- tural language differences, or speech disorders such as aphasia or stuttering. Stu- dents interested in specializing beyond the typical broad M.A. program should consult the department for lists of suggested courses, practices and independent studies.

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

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 12 quarter hours of credit in the completion of an acceptable thesis representing original independent research. At least two-thirds of these total courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass the comprehensive examination. A mini- mum of 32 quarter hours must be at the 5000 level. The choice of the thesis or non-thesis program is normally made following completion of 5110 and 5119. 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 and language pathology, audiology, or speech and hearing sciences. 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 eural 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 disor- ders; 3. Related disciplines providing insight into human communication processes; 4. Technical skills in instrumentation and experimental design which enable the stu- dent to investigate problems pertaining to speech and hearing processes. The program will normally consist of three
or more calendar years of graduate study beyond the Master's degree with the first year being devoted, primarily to formal course work and the last year to full-time research culminating in the doctoral dissertation.

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

1. Successful completion of course work in the study of one or more research tools, or other specific scientific methodological vehicles pertinent to the research interests of the candidate. The choice of research tools 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 fields of audiology, speech and language pathology, and speech and hearing science; advanced knowledge of the specifics of the area of specialization.
5. Research and dissertation to give at least 36 hours of graduate credit (6000 level).
6. A final oral examination.

4040 Introduction to Clinical Practice in Speech Pathology (3) Prerequisites for clinical experience in a variety of clinical and diagnostic specialties which will focus on the nature of the client, the goals of treatment, and evaluation.

4120 Introduction to the Psychological Principles of Audiology and Speech Pathology (3) Introduction to the psychological principles of audiology and speech pathology, and the relationship of these principles to the practice of audiology and speech pathology.

5200 Seminar on Speech and Language Pathology (3) Seminar on speech and language pathology, including the nature of the disorder, the clinical presentation, and the treatment of the disorder.

5017 Instrumental Analysis and Speech Pathology (3) Principles of instrumental analysis used in audiology and speech pathology.

5045 Practicum in Hearing Aid Orientation and Communication (3) Practicum exposure to the clinical practice of hearing aid fitting and emergency management.

4060 Clinical Practice in Audiology (1-6) Prerequisite: 4720 and 4530.

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

4620 Clinical Practice in Audiology (1-6) Prerequisite: 4620, 4720, and 4930. May be repeated. Maximum 9 hrs.

5030 Practicum in Verbo-Tonal Habilitation (1-6) Prerequisite: 4540, 5950, or consent of instructor. May be repeated. Maximum 9 hrs.

5051 Practicum in Aural Rehabilitation (1-6) Prerequisite: 4720 and 4530. May be repeated. Maximum 9 hrs.

5060 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems, with emphasis on their role in speech and language, Prerequisite: 4930. F, W

5070 Anatomy and Physiology of Hearing (3) Structure and function of the human ear, pathology of hearing impairment, and psychoacoustic of audition. Prerequisite: 3710. F

5071 Electrophysiological Assessment of Auditory Function (2) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by ear, hair cell, and ear as a mechanical mechanism. Prerequisite: 4720, 5070 or consent of instructor. Sp

5110 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, application of statistics, and completion of pilot research project. Prerequisite: Elementary statistics. F, W, Su

5117 Instrumentation in Audiology and Speech Pathology (3) Principles and use of instruments for measuring speech and hearing processes. Prerequisite: 3117. F

5200 Seminar on Stuttering (3) Current significant research in stuttering and management. Prerequisite: 4310 or consent of instructor. W, Su

5320 Seminar: Articulation Disorders (3) Current significant research in theory and management of voice disorders. Prerequisite: 4450 or consent of instructor. F, Su

5320 Seminar: Voice Disorders (3) Current significant research in theory and management of voice disorders. Prerequisite: 4450 or consent of instructor. W, Su

5350 Advanced Clinical Practice in Speech Pathology and Language Disorders (1-6, 1-6, 1-6) Prerequisite: 4940 or equivalent and consent of instructor. 5240 may be repeated, Maximum 9 hrs.

5350 Advanced Clinical Practice in Speech Pathology and Language Disorders (1-6, 1-6, 1-6) Prerequisite: 4940 or equivalent and consent of instructor. 5240 may be repeated, Maximum 9 hrs.

5400 Advanced Clinical Practice in Audiology: Off-Campus Sites (1-6) Prerequisite: 4720 and 4530. May be repeated. Maximum 9 hrs.
2. A minimum of 12 quarter hours of approved biology courses beyond the intro-
ductive level, including at least 3 hours of genetics and 3 hours of physiology.
4. At least 9 hours of advanced lecture-
seminar courses from the following: 
- Biochemistry 6410, 6010.
- At least 9 hours of Master's research and a thesis.
5. A final oral examination which will cover both the thesis endeavor and the subject
matter of the course requirements.

THE DOCTORAL PROGRAM

An incoming student must present course work covered by an undergraduate major in the biological sciences, chemistry or bio-
chemistry. Departmental requirements for the awarding of the Ph.D. include mastery of the subject matter indicated in the following list:

1. Introductory Organic Chemistry with laboratory (at least 1 year); Introductory
Physiology; Differential and Integral Calculus; minimum of three quarters of approved
physical chemistry (Biochemistry 4210-20-30 or Chemistry 3410-20-30) and at least 18
hours of biology beyond the introductory level including at least 3 hours of genetics and 3 hours ofphysiology.

3. At least two quarters of approved grad-
uate courses in chemistry, or other physical sciences, for example, Chemistry
5110-20-35, Chemistry 5440, Physics
5210-20-30, Physics 5440, Physics 5510-20-
30. A survey or review course will be allowed.
4. At least two courses selected from
5. Participation in Biochemistry 6410 and in the advanced Biochemistry Seminar
(6010) during the entire period of residence.
6. Comprehensive examination: usually taken after the first year of study.
7. A minimum of 90 quarter hours of original and significant research carried out during the term of candidacy.
8. A final oral examination which will be
concerned primarily with the student's dis-
tertation.

Petitioning for Master's degree: Students who have passed the comprehensive exami-
nation in the Ph.D. program and have completed at least 45 hours of approved course work for graduate credit, at least two-thirds of which must be at or above the 5000 level, may petition the department for a waiver of the Master's degree. The additional requirements for such a degree shall be:

a. The preparation of a research manu-
script of suitable length and quality for publication in a major scientific journal;
and 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.

b. Publication of at least one full-length paper in a major journal by senior author as
senior author.

4110 Cellular and Comparative Biochemistry (6)
Biochemical,nuclearicacid function,protein synthesis and
biochemical genetics, regulation of biological processes.
Must be taken in sequence. Prerequisite: Chemistry 3111-
21-31, 3211-21-31, and 1 course from Biology 2710-
20-30 or Biology 4010-20-30 lecture and laboratory.
4110 Cellular and Comparative Biochemistry Lab (2) 
Basic analytical and biochemical procedures in bio-
chemistry and molecular biology, protein isolation,
protein electrophoresis, spectrophotometry, chromatography, electrophore-
sis, sedimentation and enzyme assays. Prerequisite or corequisite: 4110 or equivalent. F, W
4120 Cellular and Comparative Biochemistry Lab (2) 
In depth experiences with enzymes, nucleic acids
and membranes/cytoskeletons. Chromatography and elec-
trophoresis, hybridization, sequencing, sedimentation, radiolabeling, labeling, and immunological analy-
sis. Prerequisites or corequisites: 4110 and 4119. Sp
4130 Selected Topics in Biochemistry and Molecular Biology (5) 
Selected topics of current research interest.
Topics: the structure and function of proteins,
the structure and function of nucleic acids, the structure and function of membranes, and ion channels. Prerequisite: 4110-20. Sp
4120-10 Introduction to Physical Biochemistry (3, 3)
Introduction to thermodynamics, phase sta-
tibiology and phase change; critical point;
chemical potential; osmotic pressure; and the Dulong-Pidie law. Prerequisite: Calculus. F, Sp
4130-10 Advanced Techniques in Environ-
tional Toxicology (3) 
Statistical methods in the evaluation and analysis of data, including least square
regression, and statistical testing of protein/pro-
ters and nucleic acids. Prerequisite: 4202 or Chemistry
3430, or equivalent. Sp
5000 Thesis (1-15) P/NC only. E
5110 Colloquium Research Participation (3-9) May be repeated.
Maximum 15 hrs.
5130 Experimental Techniques (3) 
Laboratory course in advanced biochemical techniques, intended primarily for graduate students in biochemistry. Prerequisite: 5110-20. F
5301-30 Experimental Techniques (3, 3) 
Laboratory course in experimental techniques. Prerequisite: 4110-20. F, W
5300-30 Advanced Techniques in Biochemistry (3, 3) 
Topics in biochemistry and molecular biology. Prerequisite: 5310. F, W
5400 selected topics in Cell medium (3) 
Topics in biochemistry of mammalian cells. Prerequisites: 5310-20; 4110.
5310-30 Advanced Biochemistry (3, 3) 
Topics in biochemistry and molecular biology. Prerequisite: 5310-20. F, W
5330-30 Advanced Biochemistry (3, 3) 
Advanced topics in biochemistry and molecular biology. Prerequisite: 5310-20. F, W
5510 Advanced Biochemistry (3) 
Basic concepts in biochemistry. Including carbohydrate, lipid, protein, amino acid, and nucleic acid metabolism. Prerequisites: 5310-20, 4110-20. F
5560 Advanced Biochemistry in Environmental Toxicology (3) 
Survey of environmental science for assessment of organic and inorganic, natural and man-induced contaminants. Study of the effects of toxic compounds in the environment. Prerequisites: 5310-20, 4210-20 or equivalent. F
5561 Advanced Biochemistry in Environmental Toxicology (3) Survey of environmental science for assessment of organic and inorganic, natural and man-induced contaminants. Study of the effects of toxic compounds in the environment. Prerequisites: 5310-20, 4210-20 or equivalent. F
Biology

4158 Scientific Illustration (3) Introduction to design and production of graphs, charts for scientific illustration, planning of poster presentations and displays. No graphics background required. Prerequisite: Advanced standing in a science curriculum; consent of instructor.

Botany

MAJOR DEGREES
Botany

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

Professors: R. W. Keeney (Head), Ph.D., Michigan; J. D. Gapinski, Ph.D., Harvard; E. C. Cech, Ph.D., Dalhousie; W. R. Beerling, Ph.D., Ohio State; A. M. Evans, Ph.D., Michigan; W. A. Mihm; Ph.D., Vanderbilt; W. D. Wolfe, Ph.D., Duke; J. C. Amundson, Ph.D., Yale; D. A. Eichorn, Ph.D., Chicago; L. A. Erickson, Ph.D., Texas; J. D. Gapinski, Ph.D., Harvard; J. H. Schuster, Ph.D., Michigan State; J. H. Shugart, Ph.D., Ohio State; I. S. Beilin, Ph.D., Kansas State; S. J. Kendeigh, Ph.D., Ohio State.

Associate Professors: C. C. Abell, Ph.D., Indiana; S. D. Hallahan, Ph.D., Ohio State; R. H. Neilson, Ph.D., Montana; G. L. Read, Ph.D., Massachusetts; W. A. Miller, Ph.D., North Carolina State; J. O. Schwarz, Ph.D., North Carolina State; J. P. Smith, Ph.D., Duke.

Assistant Professors: L. E. Selberg, Ph.D., Indiana; D. A. Smith, Ph.D., Tennessee.

M.S. Degree

Major Degree Options

1. Botany
2. Plant Cell Biology

Requirements for Admission: The Botany Department requires scores from the general and subject biology portions of the Graduate Record Examination, at least three letters of recommendation or standard recommendation forms from academic or professional persons, a short statement describing reasons for interest in graduate education 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) French, Spanish, German, Italian, Russian, or Chinese, 12 quarter hours organic chemistry and physics highly recommended; (4) college mathematics, 9 quarter hours.

M.S. Degree Programs

1. Plant Systematics
2. Plant Physiology
3. Plant Cell and Molecular Biology
4. Plant Development
5. Plant Population Genetics
6. Plant Ecology
7. Plant Evolution
8. Plant Ecology
9. Plant Ecology

THE MASTER'S PROGRAM

Thesis Option:

1. Satisfactory preparation of a written form 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 and oral comprehensive examination.


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

Note: Graduate School requirements are denoted by an asterisk. These requirements should be interpreted as minimal requirements such as additional foreign languages, additional oral comprehensive 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. Prerequisites: 6 hrs. in biological sciences. F, W


3050 Socioeconomic Impact of Plants (3) Significance of plants in origin and development of human cultures, evolution of cultivated plants, and role of plants in present civilization. Occasional field trips. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent.

3210 Introductory Plant Physiology (4) Organismal physiology of plants, water relations, mineral nutrition, transpiration, photosynthesis, stomatal movements, effects of age, light, temperature, and environmental factors. Lectures and labs. Prerequisite: 1-yr general chemistry and 1 yr biology. F, W

4017 Field Mycology (3) Field experience on identification of fungal groups. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. S, A

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

4022 Field Lichenology (3) Field experience on identification of lichens. Frequent field trips, field recognition of species and habitats. Laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. S, A

5093 Field Agroecology (3) Field experience in identification of grasses, Frequent field trips, field recognition of species and habitats, laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. S, A

5097 Synthesis of Plant Speciation (3) Processes of plant speciation emphasizing population genetics, environmental modification, variation in populations, establishment of population barriers and other aspects of plant speciation. Prerequisite: 3010-20 and Biology 3110. W

5098 Food Plant Vascular Plants (3) Field experience on identification of aquatic vascular plants. Frequent field trips, field recognition of species and habitats. Laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. S, A

5099 Synthesis of Plant Evolution (3) Field experience on identification of protists. Frequent field trips, field recognition of species and habitats. Laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. S, A

5061 Field Botany (3) Field experience on identification of flowering plants, Frequent field trips, field recognition of species and habitats, laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. S, A

5070 Botanical Photography (3) Photography of natural history subjects and achievement of technical skill in use of photographic equipment for class, seminar or public lecture. Landscapes, close-up and small objects, publication quality, black and white, color, using 35 mm format. Limited shared equipment. 4 hrs. of lab work. Recommended prerequisite: 3010-20 or equivalent. F

5080 Plant Population Genetics (3) Field experience on identification of plants and ferns in nature. Frequent field trips, field recognition of species and habitats. Limited shared equipment. 4 hrs. of lab work. Recommended prerequisite: 3010-20 or equivalent. W

6010 Plant Cell Biology (3) Field experience on developmental and physiological processes of plants. Frequent field trips, laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. W

6080 Plant Population Genetics (3) Field experience on identification of plants and ferns in nature. Frequent field trips, laboratory sessions. Prerequisite: 6 hrs. in botany. Recommended prerequisites: 3010-20 or equivalent. W

6090 Plant Physiology (3) Field experience on identification of plants in natural environments including plant identification, collection, preservation and tissue ecological concepts. Prerequisite: 6 hrs. in biological sciences. Sp, Su

Note: Not for graduate credit for botany majors.

4340 Paleobotany (4) (Same as Geology 4240.)

4130 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Prelim 1110-1110; 3 hrs and 2 labs. Prereq.: 1110-1110 or equivalent; 2 hrs and 1 lab. Required for the non-thesis student not otherwise granted 1 year physics and chemistry recommended. May be repeated with consent of instructor. S/N Only. E

5003 Non-Thesis Graduate Research (3-15) P/NP only.

5021 Bryology (4) Taxonomy, phylogeny, morphology, development, and classification of bryophytes with emphasis on field studies and current research. Prelim 3010 or equivalent. 3 hrs and 2 labs. Sp.

5031 Advanced Topics in Bryology (4) Family characteristics, morphology, development, and classification, based primarily on plants of local flora. Prelim 3030 or equivalent. 2 hrs and 1 lab. W.

5081 Phycology (4) Intensive comparative study of major divisions of algae, both freshwater and marine. Taxonomy, morphology, development, and classification, with emphasis on field studies and current research. Prelim 3010 or equivalent. 3 hrs and 2 labs. W.

5201 Vascular Plant Taxonomy (4) Family characteristics, morphology, development, and classification, based primarily on plants of local flora. Prelim 3030 or equivalent. 2 hrs and 1 lab. W.

5460 Horticulture (6) Horticulture modified to environment and their interaction with each other. Transcript examination system of anthesis, characteristics of anthesis and domestic and estuarine ecosystems; succession; deep-sea ecology systems. Prereq.: 4310 or equivalent. 2 hrs and 2 weeks. Sp.

5791 Tooth enamel morphology and Developmental Assessment in Developing Nations (3) (Same as Zoology 5370.)

5464 Seminar in Botany (1) Readings and discussion of specialized topics in phytobiological research. May be repeated. Maximum 12 credits may be counted toward the above or equivalent. 2 hrs and 2 weeks. F.

5071 Principles of Biological Illustration (3) Principls of commercial illustration including digital photography, computer graphics, and 3-D modeling. Prelim 1110-1110. Prereq.: 1110-1110. 3 hrs and 1 lab. W.

5070 Plant Biology (4) Evolutionary study of lower vascular plants, morphology, cytology, ecology, life cycles and classification. Representative studies and recent advances in the major groups. Prereq.: 1110-1110 or equivalent. 3 hrs and 2 labs. Prereq.: 1110-1110 or equivalent. 2 hrs and 1 lab. F.

5090 Morphology and Evolution of Basidiocarps (4) Structure and function of rhizomorph, fruiting structures, symbiotic relationships, and evolution of basidiocarps. Prereq.: 3010 or equivalent. 3 hrs and 2 labs. F.

5100 Agroecology (4) Agroecosystems, communities, and plant diversity. Prereq.: 2020 or consent of instructor. 2 hrs and 2 weeks. F.

5150 Advanced Morphology of Flowering Plants (4) Vegetative and reproductive morphology: reproductive biology, floral development, population biology, and sexual reproduction. Prereq.: 1110-1110 or equivalent. 3 hrs and 2 weeks. F.

5220 Advanced Botanical Physiology (4) Physiology of plant tissues and organs; cell and tissue physiology; photosynthesis and respiration; water relations; radiation and temperature. Prereq.: 4310 or equivalent. 3 hrs and 2 weeks. F.

5240 Advanced Plant Physiology (4) Growth and differentiation of plants at cellular, molecular and organellar levels. Hormonal regulation of development; macromolecular interpretation of differentiation; membrane transport; flowering and senescence. Prereq.: 4310 or equivalent. 3 hrs and 2 weeks. F.

5290 Quantitative Problems (4) (Same as Zoology and Ecology 5290.)

5291-5292 Special Problems in Botany (1-1, 1-2)

5294 Plant Geobiology (5) Distribution of ecosystems with emphasis on American types. Vegetation, climatic and historical aspects. Prereq.: 4310. 2 hrs and 2 weeks. W.

5350 Analysis of Plant Communities (4) Plants as ecosystem components considered from standpoint of genecology, ordination, and ecosystem functions. Prereq.: 4310. 2 hrs and 2 weeks. F.

5360 Marine Ecology (3) Relationships of marine organisms to their environment and the interactions with each other. Transcript examination system of anthesis, characteristics of anthesis and domestic and estuarine ecosystems; succession; deep-sea ecology systems. Prereq.: 4310 or equivalent. 2 hrs and 2 weeks. Sp.

5370 Natural Resource Management and Environmental Assessment in Developing Nations (3) (Same as Ecology 5370.)

5458 Seminar in Botany (1) Readings and discussion of specialized topics in phytobiological research. May be repeated. Maximum 12 credits may be counted toward the above or equivalent. 2 hrs and 2 weeks. F.

5510 Systems Biology (3, 3) 5510—Natures of ecological systems. System state and change of state. Elementary system concepts of ecosystems. Prelim 1110-1110. Prereq.: 1110-1110 or equivalent. 3 hrs and 2 weeks. F.

5740 Population Biology (4) (Same as Zoology 5740.)

5741-5742-5743 Advanced Molecular Techniques: Isolation of subcellular components; differentiation and organization in cytoplasmic and nuclei. Prereq.: 3010 or equivalent. 3 hrs and 2 weeks. W.

5830 The Field Research Problem (4) Conceptualization, planning, and implementation. Field practice. Criteria for choosing instruments, sampling methods, and locations for study of populations, communities, and ecosystem. Field practice and development and critique of formal research proposal liked those required by granting and contracting agencies. Prereq.: 4310, 5510 or Zoology 4240. 2 hrs and 1 lab. F.

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

5970 Experimental Plant Genetics (4) Genes of plants using molecular and cellular techniques and understanding of genes a action, controlling elements, mutation, crossing-over, recombinetics, chromosome recombination, and meiosis. Prereq.: 3110 and Chemistry 3213 and Chemistry 3217 and Chemistry 3216 and 3 hrs and 1 lab. W.

5990-51-52-53-54 Advanced Plant Genetics (5-2-4) Advanced plant genetics selected from broad categories of experimentation, population genetics, plant breeding, plant pathogen genetics, and development of genetic resources of crop plants. May be repeated with consent of instructor. 3 hrs and 2 weeks. Prereq.: 3110 and Chemistry 3213 and Chemistry 3217 and Chemistry 3216 and 3 hrs and 1 lab. F.

6000 Doctoral Research and Dissertation (3-15) Prereq.: 2020 or equivalent.

6010 Advanced Topics in Morphology of Vascular Plants (4-6) Topics are selected from broad categories of experimentation, population genetics, plant breeding, plant pathogen genetics, and development of genetic resources of crop plants. May be repeated with consent of instructor. 3 hrs and 2 weeks. Prereq.: 2020 or equivalent. 3 hrs and 2 weeks. F.

6050 Advanced Topics in Cryptogamic Botany (2-4) Advanced studies and current research in experimental cytology, mycology, mycology, physiology, or methodology of development of cryptogams. May be repeated with consent of instructor. 2 hrs and 2 weeks. F.

6100 Advanced Topics in Cytology and Cell Biology (2-4) Advanced studies and current research in experimental cytology, mycology, mycology, physiology, or methodology of development of cryptogams. May be repeated with consent of instructor. 2 hrs and 2 weeks. F.

6200 Plant Anatomy and Analysis of Subcellular Structures (2-4) Principles of function and development of subcellular structures, such as actions of chemicals on cell development, control of cellular or subcellular structures in selected cryptogamous organisms and cell structures, experimental cytology, cellular and subcellular functions, and photosynthesis. Prereq.: 4310. Biology 3110; Biology 4110-4111; Prereq.: 3110 and Chemistry 3213 and Chemistry 3217 and Chemistry 3216 and 3 hrs and 1 lab. Prereq.: 3110 and Chemistry 3213 and Chemistry 3217 and Chemistry 3216 and 3 hrs and 1 lab. F.

6300 Ecophysiology of the World (3) Classification and characterization of world's regional ecosystems. Interactions of environment, soil, climate, vegetation, and fauna. Prereq.: 3110. 3 hrs. F.

6370 Applied Ecology (3) (Same as Ecology 6370.)

6400 Advanced Topics in Genetics (2-4) Literature survey of selected topics from all areas of genetics. Prereq.: Biology 3110/Biochemistry 5110. May be repeated with consent of department. 2 hrs and 2 weeks. F.
The program leading to the M.S. degree in Chemistry can be divided into seven areas for the M.S. degree: analytical chemistry, physical chemistry, polymer science, and theoretical chemistry. The program in chemical physics is concerned with the structure and reactivity of small molecules in simple systems. Molecular spectroscopy and structural chemistry, thermodynamics, and the principles of quantum mechanics are emphasized. Students must complete at least 36 hours of graduate credit at the 6000 level and one of the following groups:

1. For analytical, 5250-60-70, Ecology 5310, and Environmental Engineering 4030.
2. For inorganic, 5250-60-70, 5340-50, 5410-20-30, 5710-30.
4. For specialization in polymer science, 5511, 5521, 5531.
5. For specialization in environment or resource economics, 5220, 5610-20-30, 5710-30.
6. For specialization in chemical physics, 5511, 5521, 5531.
7. For specialization in polymer science, 5510-60-30 or 5250-60-70 or 5710-20-30, 5810, and Mechanical Engineering 4180.

For the Ph.D. degree in Chemistry, the student must complete a thesis which gives 9 to 18 credit hours. A final oral examination is required. A program leading to the Ph.D. degree in Polymer Engineering requires an additional graduate course work including 6 hours at the 6000 level and one of the following groups:

1. For analytical, 5250-60-70, Ecology 5310, and Environmental Engineering 4030.
2. For inorganic, 5250-60-70, 5340-50, 5410-20-30, 5710-30.
4. For specialization in polymer science, 5510-60-30 or 5250-60-70 or 5710-20-30, 5810, and Mechanical Engineering 4180.

For specialization in polymer science, 5510-60-30, 5310-50, 5160 or 5710, Polymer Engineering 4160. 30 hours of additional graduate course work, including at least 5 hours at the 6000 level and at least 12 hours of chemistry courses; participation in the Polymer Seminar Program during the entire period of graduate study. Graduate course work in related fields may be used for unduplicated course work in this requirement upon approval of the student's faculty committee.

All course selections must be approved by the department and must be approved by the student for credit not having for the lecture.

6. A final oral examination is required. The department offers specialization in the following areas for the Ph.D. degree: analytical chemistry, physical chemistry, environmental chemistry, inorganic chemistry, organic chemistry, physical chemistry, polymer science, and theoretical chemistry. The program in chemical physics is concerned with the structure and reactivity of small molecules in simple systems. Molecular spectroscopy and structural chemistry, thermodynamics, and the principles of quantum mechanics are emphasized. Students must complete at least 36 hours of graduate credit at the 6000 level and one of the following groups:

1. For analytical, 5250-60-70, Ecology 5310, and Environmental Engineering 4030.
2. For inorganic, 5250-60-70, 5340-50, 5410-20-30, 5710-30.
4. For specialization in polymer science, 5510-60-30 or 5250-60-70 or 5710-20-30, 5810, and Mechanical Engineering 4180.

For the Ph.D. degree in 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. Participation in seminar 5911-21 during the entire period of graduate study.
3. A final oral examination.

For the Ph.D. degree in 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. Participation in seminar 5911-21 during the entire period of graduate study.
3. A final oral examination.

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2. Participation in seminar 5911-21 during the entire period of graduate study.
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For the Ph.D. degree in 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. Participation in seminar 5911-21 during the entire period of graduate study.
3. A final oral examination.

4110 Advanced Analytical Chemistry (3) Chemical separations including chromatography, ion exchange and solid-phase extraction. Spectrophotometric techniques. Prerequisites: Analytical Chemistry. W.

6010 Nuclear Chemistry (3) Nuclear properties, radiation, radioactivity, radionuclide processes, nuclear structure and models, nuclear reactions, radiation and mass spectrometry. Prerequisites: 1 year of physical chemistry. F, W, Sp.


4500 Statistical Thermodynamics (3) Statistical mechanics; quantum mechanics of simple systems; thermal and phase equilibria. Prerequisite: 3410-20-30.

4521 Survey of Inorganic Chemistry (3, 3, 3) Atomic structure, coordination compounds, and transition metal complexes; inorganic synthesis, characterization of inorganic compounds, and applications. Prerequisites: 4110 and 4200. Not open to students in 4110-20-30-39.

5050 Thesis (1-15) P/N only. E

5110 Biochemical Chemistry (3, 3, 3) Structure, reactions, and mechanisms of aliphatic, aromatic, and cyclic compounds. Prerequisite: 3410-21-31.

5121 Advanced Organic Chemistry Laboratory (3) Synthetic reactions of organic compounds illustrating modern techniques. Prerequisites: 1 year of organic chemistry. Sp.

5130 Spectroscopic Characterization of Organic Compounds (3) Practical information and an advanced introduction to modern spectroscopic methods for structural identification of organic compounds. Prerequisites: 3410 and 4210.

5140 Organic Chemistry of Polymers (3) Polymerization reactions, vinyl, acrylate, isoprene, polyesters, polyamides. Prerequisite: 3410.

5200 Analytical Chemistry of Environmental Pollutants (3) Application of modern analytical chemistry to problems in aquatic and atmospheric pollution. Prerequisites: 6250-60-70 or consent of instructor. A.

5240 Chemical Instrumentation (4) Principles of chemical instrumentation, instrumentation design, and theory. Prerequisites: Analytical Chemistry. Consent of instructor.

5250-60-70 Advanced Analytical Chemistry (3, 3, 3) Application of modern analytical chemistry to problems in the chemical and physical sciences. Prerequisites: 4210-70-80 or consent of instructor. A.

5260 Chemical Separation Methods (3) Principles of separation methods: solvent extraction, chromatography, electrophoresis, liquid-liquid partition, and solid-phase extraction methods. Prerequisites: 5250-60-70 or consent of instructor. A.

5340 Quantum Chemistry (1) Introduction to quantum mechanics: quantum states, introduction to group theory; perturbation theory; nuclear of organic molecules. Prerequisites: 3420. A.

5410-20-30 Advanced Physical Chemistry (3, 3, 3) Classical, quantum, statistical, and solid-state physical chemistry; structure and symmetry. Prerequisites: 4340-20-30.

5460 Statistical Thermodynamics (3) Statistical thermodynamics, statistical mechanics, and the kinetic theory of structures. Prerequisites: 4110 or 4160 and 4210.

5511 Survey of Inorganic Chemistry (3) Atomic structure, coordination compounds, and transition metal complexes; inorganic synthesis, characterization of inorganic compounds, and applications. Prerequisites: 3420. A.

5971 Independent Study in Chemistry (1-15) P only. E

5991 Doctoral Research and Dissertation (3-15) P/F only. E

5995 Directed Taped Topics in Organic Chemistry (2-3) Subj matter varies among important topics of current research. Prerequisites: May be repeated. Maximum 9 hrs. A.

6130 Natural Product Chemistry (3) Structure, chemical transformation, and isolation of natural products of Biological or environmental significance. Course content varies with each offering to reflect areas of current chemical interest. Prerequisites: Two of 5110-20-30.

6150 Theoretical Organic Chemistry (2-3) Application of the fundamental principles of quantum mechanics to the analysis of ground and excited states of molecules. Prerequisites: Two of 5110-20-30, 5340. A.

6151 Physical Organic Chemistry (3) Application of the fundamental principles of quantum mechanics to the analysis of ground and excited states of molecules. Prerequisites: Two of 5110-20-30, 5340. A.

6260 Nuclear Chemistry (3) Nuclear properties, radiation, radioactivity, radionuclide processes, nuclear structure and models, nuclear reactions, radiation and mass spectrometry. Prerequisites: 1 year of physical chemistry. F, W, Sp.

6310 Doctoral Seminar (1-3) P only. A.

6331 Seminar (1-6) P only. A.

6351 Doctoral Research and Dissertation (3-15) P/F only. E

6511-21-31 Chemistry Seminar (1, 1, 1) Departmen- tal research, current research literature, general topics, seminars, and current research literature. Prerequisites: May be repeated except summer for resident graduate students. S, W, F, Sp.


6591 Nuclear Chemistry (3) Nuclear properties, radiation, radioactive decay processes, nuclear structure and models, nuclear reactions, radiation and mass spectrometry. Prerequisites: 1 year of physical chemistry. F, W, Sp.

6690 Doctoral Research and Dissertation (6-15) P only. E

6715 Organic Photochemistry (3) Physical and chemical processes which involve light. Prerequisites: 5340. A.

6750 Experimental Photochemistry (3) Physical and chemical processes which involve light. Prerequisites: 5340. A.

6810 Computational Chemistry (3) Structure, binding and synthesis of organic and inorganic compounds. Application of computational methods to research and an understanding of mechanistic and structural relationships in organic synthesis. Prerequisites: Two of 5110-20-30.

6430 Photochemistry and Radiation Chemistry (3) Electron-captureless transitions as studied by optoacoustic techniques, energy partitioning and transfer, phase equilibria, condensation phenomena, and statistical mechanical methods to systems of chemical reactions. Prereq: 5340.

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5110-20-30-50, 5340-50. May be repeated. Maximum 9 hrs. A

6730 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

6740 Electronic Structure of Radicals (3) Application and electron-transfer processes. Prereq: 5430.

6745 Structural Electronic Spectroscopy (3) Applications of modern methods of spectroscopic analysis, including vibrational and rotational spectroscopy, and methods of quantum state analysis. Prereq: 5340.

6400 Chemistry of Radiation Chemistry (3) Fundamental principles of chemical kinetics and mass spectrometric analysis of complex systems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

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

6811 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance: nuclear decay schemes, nuclear models, potential-energy surfaces, reaction cross-sections, and applications to problems of nucleosynthesis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6820 Molecular Vibration-Rotation Theory (3) Advanced study of problems related to the structure, conformation, structure, and bonding in inorganic and organic molecules. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6830 Topics in Classical Civilizations (1-3) Topics in art, literature, religion, and society of ancient Greece and Rome. May be repeated with consent of department. Maximum 9 hrs. A

6840 Topics in Classical Archaeology (3) Varied content course offering subject matter not taught in existing course or concentrating on one aspect of existing survey. Prereq: According to topic. May be repeated. Maximum 9 hrs. A

6850 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance: nuclear decay schemes, nuclear models, potential-energy surfaces, reaction cross-sections, and applications to problems of nucleosynthesis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6860 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance: nuclear decay schemes, nuclear models, potential-energy surfaces, reaction cross-sections, and applications to problems of nucleosynthesis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6870 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance: nuclear decay schemes, nuclear models, potential-energy surfaces, reaction cross-sections, and applications to problems of nucleosynthesis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6880 Statistical Thermodynamics (3) Application of principles of statistical thermodynamics to the description of thermal properties and electronic structure of complex systems. Prereq: 5410 or equivalent. May be repeated. Maximum 9 hrs. A

6890 Advanced Analytical Chemistry (3) Principles of magnetic resonance spectroscopy, nuclear magnetic resonance and electron spin resonance. Chemical applications to food and environmental systems. Prereq: 5410. May be repeated. Maximum 9 hrs. A

6910 Advanced Analytical Chemistry (3) Principles of magnetic resonance spectroscopy, nuclear magnetic resonance and electron spin resonance. Chemical applications to food and environmental systems. Prereq: 5410. May be repeated. Maximum 9 hrs. A

6950 Advanced Analytical Chemistry (3) Principles of magnetic resonance spectroscopy, nuclear magnetic resonance and electron spin resonance. Chemical applications to food and environmental systems. Prereq: 5410. May be repeated. Maximum 9 hrs. A


7000 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7010 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7020 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7030 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7040 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7050 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7060 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7070 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7080 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7090 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7100 Topics in Quantum Chemistry (3) Application of quantum theory to the electronic and molecular properties of new synthetic compounds. Prereq: 5050. May be repeated. Maximum 9 hrs. A

7110 Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance: photophysical spectroscopy, transuranium elements, common inorganic methods, electronic spectra of heavy metal ions, and applications to inorganic and biochemical systems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A
other disciplines meet some of the course requirements. 5090 .

4. Mathematical maturity equivalent to that of a student who has completed the calculus sequence through one year of multivariable calculus and matrix algebra.

The MASTER'S PROGRAM
All candidates must receive departmental credit for or exhibit proficiency in the following courses:

1. Complete 45 hours of course work at the 5000 level (no more than 9 hours at the 4000 level or above, including at least 33 hours at the 5000 level).

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

Non-Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level, but excluding 5100 and 5109.

2. Write a paper and oral examination in one of the following areas:

   a. Scientific computing
   b. Computer systems
   c. Computer architecture
   d. Computer organization
   e. Computer networks
   f. Computer security
   g. Artificial intelligence
   h. Human-computer interaction
   i. Software engineering
   j. Database systems
   k. Mobile computing
   l. Security and privacy

3. One of the three courses Computer Science 4710, 4730, or 4225.

The student may then select either option.

Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level (no more than 9 hours of which may be thesis hours), but excluding 5100 and 5109.

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

American Indian Education Act (I-E) Credit

Successful completion of Computer Science 4710, 4730, or 4510.

4. Mathematical maturity equivalent to that of a student who has completed the calculus sequence through one year of multivariable calculus and matrix algebra.

The MASTER'S PROGRAM
All candidates must receive departmental credit for or exhibit proficiency in the following courses:

1. Complete 45 hours of course work at the 5000 level (no more than 9 hours at the 4000 level or above, including at least 33 hours at the 5000 level).

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

Non-Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level, but excluding 5100 and 5109.

2. Write a paper and oral examination in one of the following areas:

   a. Scientific computing
   b. Computer systems
   c. Computer architecture
   d. Computer organization
   e. Computer networks
   f. Computer security
   g. Artificial intelligence
   h. Human-computer interaction
   i. Software engineering
   j. Database systems
   k. Mobile computing
   l. Security and privacy

3. One of the three courses Computer Science 4710, 4730, or 4225.

The student may then select either option.

Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level (no more than 9 hours of which may be thesis hours), but excluding 5100 and 5109.

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

American Indian Education Act (I-E) Credit

Successful completion of Computer Science 4710, 4730, or 4510.

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

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   d. Computer organization
   e. Computer networks
   f. Computer security
   g. Artificial intelligence
   h. Human-computer interaction
   i. Software engineering
   j. Database systems
   k. Mobile computing
   l. Security and privacy

3. One of the three courses Computer Science 4710, 4730, or 4225.

The student may then select either option.

Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level (no more than 9 hours of which may be thesis hours), but excluding 5100 and 5109.

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

American Indian Education Act (I-E) Credit

Successful completion of Computer Science 4710, 4730, or 4510.

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level, but excluding 5100 and 5109.

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

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   b. Computer systems
   c. Computer architecture
   d. Computer organization
   e. Computer networks
   f. Computer security
   g. Artificial intelligence
   h. Human-computer interaction
   i. Software engineering
   j. Database systems
   k. Mobile computing
   l. Security and privacy

3. One of the three courses Computer Science 4710, 4730, or 4225.

The student may then select either option.

Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level (no more than 9 hours of which may be thesis hours), but excluding 5100 and 5109.

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

American Indian Education Act (I-E) Credit

Successful completion of Computer Science 4710, 4730, or 4510.

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level, but excluding 5100 and 5109.

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

Non-Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level, but excluding 5100 and 5109.

2. Write a paper and oral examination in one of the following areas:

   a. Scientific computing
   b. Computer systems
   c. Computer architecture
   d. Computer organization
   e. Computer networks
   f. Computer security
   g. Artificial intelligence
   h. Human-computer interaction
   i. Software engineering
   j. Database systems
   k. Mobile computing
   l. Security and privacy

3. One of the three courses Computer Science 4710, 4730, or 4225.

The student may then select either option.

Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level (no more than 9 hours of which may be thesis hours), but excluding 5100 and 5109.

2. Complete at least 9 hours of thesis credit, Computer Science 6000.

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

American Indian Education Act (I-E) Credit

Successful completion of Computer Science 4710, 4730, or 4510.
Women's Studies

4340: The Concept of Women (4) (Same as Philosophy 3440)

4350: Topics in Women's Studies (4)

4370: Women in American History (4) (Same as History 3430 and American Studies 3470)

4570: Psychology of Women (3) (Same as Psychology 4570)

4830: Afro-American Women in American Society (4)

4850: Women in European History (4) (Same as History 4800)

4870: Contemporary Research on the Behavior of Women (3) (Same as Sociology 4870)

5110: Psychology of Women (3) (Same as Education and Counseling Psychology 5110)

Economics

See College of Business Administration

English

MAJOR

DEGREES

English

M.A., Ph.D.

Professor:
J. R. Fradenburg (Ph.D. Princeton);
D. N. Fisk (Ph.D. Duke; B. A. Harvard; Associate Head);
M. E. Smith (Ph.D. Texas; J. R. Y. Taft; Associate Professor);
R. H. Fisk (Ph.D. Indiana; Associate Professor);
I. S. Aliprandi (Ph.D. Stanford; Associate Professor);
G. T. Spencer (Ph.D. Stanford; Associate Professor);
T. D. Cox (Ph.D. Missouri; Associate Professor)

Associate Professor:
L. H. Garberich (Ph.D. Chicago; D. A. Cornell; Ph.D. North Carolina; D. E. Cox; Ph.D. Minnesota)
B. F. Dunn (Ph.D. Arizona; D. F. Boston; Ph.D. Texas; M. G. Craver; Director of Graduate Studies; Associate Professor)
T. J. A. Hoffmeister (Ph.D. Cambridge; M. J. D. Edgar; Assistant Professor)
S. J. Aliprandi (Ph.D. Stanford; Associate Professor)
G. T. Spencer (Ph.D. Stanford; Associate Professor)
G. R. Maland (Ph.D. Michigan; Ph.D. Indiana; Ph.D. Illinois; Ph.D. Iowa; Ph.D. Wisconsin; Ph.D. Stanford; Professor)

Assistant Professors:
A. Allbritton (Ph.D. Florida State; D. L. Gelatkin; Ph.D. California; M. D. Robinson; Ph.D. Texas; Associate Professor)
B. C. Brown (Ph.D. Emory; M. D. Robinson; Ph.D. Texas; Associate Professor)

Assistant Professor:
W. Zylberszlag, B.A. Northwestern

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

THE MASTER'S PROGRAM

The departmental requirements for the M.A. degree in English include (1) thesis and 36 quarter hours of courses in the Department of English or 45 quarter hours without a thesis, (2) evidence of proficiency in one foreign language, and a final examination for thesis students, written and oral for non-thesis students. The courses should include:

- 12 hours at the 6000 level, 12/21 hours of additional courses at the 5000-6000 level, and 12 hours at any level for graduate credit, including the 3000-4000 level. A reading list is in the office of the Director of Graduate Studies in English.

The A.B. with writing option is intended for those students who plan to do free-lance writing, specialists in teaching writing courses at the college level, or work as professional writers in business or industry. Students who go on to complete the Ph.D. may also find the A.B. with writing option helpful when they are seeking teaching positions.

1. A minimum of 36 quarter hours beyond the B.A. degree.
   a. 12 hours at the 6000 level.
   b. 12 additional at the 5000-6000 level. (A student may take only 3 hours of 5103 Independent Study toward the degree.)
   c. 12 hours for graduate credit at any level, including the 3000-4000 level.
   d. 18-21 hours at the 5000-6000 level, 12-21 hours of additional courses at the 5000-6000 level, 12-21 hours of literature, the remainder of the courses should include:
      a. A thesis, using research to analyze some aspect of writing or rhetorical theory, for which 9 hours credit is given.
      b. A creative project, for which 9 quarter hours credit is given. A collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose would be acceptable as creative projects.
      c. A final oral examination consisting of questions covering the general history and interpretation of literature, and American literature. A reading list is available in the Office of the Director of Graduate Studies in English. This reading list may be modified by the M.A. examining committee, meeting in a body with the student, to reflect the candidate's particular interests, but most of the oral examination should focus upon the literature outlined in the original reading list.
      d. Evidence of proficiency in one foreign language.

THE DOCTORAL PROGRAM

The departmental requirement for the Ph.D. degree in English is completion of a maximum of three consecutive years of graduate study. This includes a balanced program of at least 72 quarter hours (or the equivalent) in English; 36 hours at the 6000 level, 24 additional at the 5000-6000 level, and 12 hours for graduate credit at any level, including the 3000-4000 level. In addition, 9 or 6 hours for the dissertation may be taken from any other university or institution, but these must be taken at no less than 36 quarter hours. After all, or most of the course work has been taken and after the two language requirements have been satisfied, the student will take four comprehensive examinations, covering different areas developed as the department directs. Successful completion of these examinations will be followed by the writing of the dissertation and by an oral examination in the field of the dissertation.

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

1211 Written and Oral English for Foreign Students (3) Rapid review of English grammar and pronunciation with intensive oral, aural, and written drill. Required during the first quarter of residence of foreign students. Normally only a student with the M.A. degree is permitted to register for this course. A student who has been exempted by the department directs. Successful completion of this course is required for foreign students to complete 1211, A, B, C, D, 3 credit. Students exempted for this course are permitted to register for only 2 other courses. E

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

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


3120 Written and Oral English for Foreign Students (6) Emphasis on the more advanced structures of English grammar and paragraph writing. Required during the first quarter of residence of foreign students. Normal only a student with the M.A. degree is permitted to register for this course. A student who has been exempted by the department directs. Successful completion of this course is required for foreign students to complete 1211, A, B, C, D, 3 credit. Students exempted for this course are permitted to register for only 2 other courses. E

5110 Multilingual (3) Multilingual literature, the study of literature of the former British colonies and the former languages of the United States.

3210-12: Modern English Literature of the Nineteenth Century (3, 3) Survey of literature dealing with leading movements in politics, science, religion, and literature during the 19th century through the 1920's. Required during the first quarter of residence of foreign students. Normal only a student with the M.A. degree is permitted to register for this course. A student who has been exempted by the department directs. Successful completion of this course is required for foreign students to complete 1211, A, B, C, D, 3 credit. Students exempted for this course are permitted to register for only 2 other courses. E


3530 Elizabethan Drama (3) Elizabethan Theater, 3530: Shakespeare's plays.
4250 Advanced Fiction-Writing (3) Further development of skills acquired in basic Writing Fiction course.

4270 Advanced Poetry Writing (3) Further development of skills acquired in basic Writing Poetry course.

4250-30-30-40 THe British Novel (3, 3, 3, 3) -- Doctor to Jane Austen; 4310---Scott to Trollope. 

4340 (3) Language of literature in relation to society. Empirical and theoretical study. Emphasis on individual and on large-scale societal units: tribes, nations, and social classes. Prereq: 3330 or Linguistics 2000 or consent of instructor.

4260 Special Topics in English Linguistics (3) May be repeated with consent of department. (Same as Linguistics 4470.)

4410 Quantitative Analysis of Language (3) Techniques of studying variation in language both in spoken and in written literature. Including identifying differences, analyzing data, and interpreting results. Implications for linguistic and/or literary theory. Prereq: 3330 or Linguistics 2000 or consent of instructor.

4141-41-42 English and the Oral Tradition (3) Special topics in the oral tradition. May be repeated with consent of instructor.

4450 Dialectology (3) Theories and methodologies of the study of pronunciation and inflection and syntax. Prereq: Linguistics 2000 or consent of instructor.

4180 Middle and Early Modern English (3, 3) Phonetic transcription, Old English, development of modern English, pronunciations, and usage. Prereq: 3330 or consent of instructor.

4150 Independent Study (1-12) See page 104. E

4120-20-30 Reading in American Literature from the Colonial Period to the Present (3, 3, 3, 3) F, A, W, A; S

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student wishes to use facilities of the university, facilities of the research laboratories, or use up unused credits from previous quarters. May not be used toward degree requirements. S/NC only. E

5101 Foreign Study (1-15) See page 104.

5102 Off-campus Study (1-15) See page 104.

5103 Independent Study (1-15) See page 104. E

5110 Teaching Freshman Composition (3) Introduction to teaching of Freshman English through study of various theories and methodologies of composition. Required of all first-year teaching assistants. F

5105 Old English Prose (3) A

5106-Major Works of English Literature (3) 5170---Shakespeare to the Restoration. Preprerequisite: 3330 or consent of instructor. Prereq: English, developments in pronunciation and vocabulary.

5210-20-30 Reading in American Literature from the Colonial Period to the Present (3, 3, 3, 3) F, A, W, A; S

5420 Readings in Black American Literature (3) Critical analysis of poetry, short stories, novels, history and critical background; discussion of relevance and unrelevance of race as influence on text and reader.

5260 Fiction Writing (3) Advanced fiction projects, under supervision of instructor and for independent study. Prereq: Extensive background in reading and writing fiction.

5250 Writing of Advanced Non-Fiction Prose: The Genres (2) Practice in writing of biography, travel book, textbook, historical study, and associated genres. Viewpoint is creative. Prereq: 4000 level writing course or consent of instructor.

5270 Poetry Writing (3) Major poetic projects or conclusion of project begun 4310. Individual consultation with instructor. Prereq: 4000 level writing course or consent of instructor.

5280 Special Topics in Writing (1-3) Topics vary. May be repeated. Maximum 9 hrs. Enrollment by consent of Director of Graduate Studies only.

5390 Analysis of Technical Writing (3) Theory and practice of writing, technical and scientific. Explores the current theories of scientific, technical, business, technical, academic, and government writing. Analysis of strands existing in technical writing. Prereq: 3330 or consent of instructor.

5410 Thesis (1-15) P/NP only. E

5410 Independent Study (1-12) See page 104. E

5490 Reading in Advanced Technical Writing (3) Further development of skills acquired in basic Technical Writing. Prereq: 3330 or consent of instructor.

5510 Southern Literature through the Nineteenth Century (3) Southern writing from colonial period to end of nineteenth century, including frontier humorists and local color writers.

5520 Southern Literature in the Twentieth Century (3) Modern Southern literary renaissance, the Fugitives, Agrarians, Faulkner and recent writers such as Welty, O'Connor, and Porter.

5600 Emerson and Thoreau (3)

4680 American Humor through Mark Twain (3) 4721-91-93 Ballad and Folklore (3, 3, 3) -- Study of traditional English and Scottish popular ballads and their North American variants. 4741-72 Native American Ballad and Folklore. 4741---The narrative: functions, categories, and patterns of storytelling.

5690 Writings in the British Novel (3) A

5810-Literature of the Extended Word (3) A

5910 Special Topics in Film Study (1-3) Content varies. May be repeated. Maximum 9 hrs. Enrollment by consent of Director of Graduate Studies only.

5920 Special Topics in Literature (1-3) Content varies. May be repeated. Maximum 9 hrs. Enrollment by consent of Director of Graduate Studies only.

5940 Advanced Film-Writing (3) Further development of skills acquired in basic Writing Film course. Prereq: 3330 or consent of instructor.

4520 Writing the Detective and Mystery Story (3) Historical study of the detective story, its development, its popularity, and its influence on prose, police procedure, private eye, spy, and adventure literature. Recommended prereq: 3460-1999 or consent of instructor.
The department offers both the thesis and non-thesis option for the Master of Science degree. Both options require a minimum of 45 quarter hours beyond completion of a baccalaureate or equivalent degree. At least two-thirds of the total hours in the graduate program must be at or above the 5000 level, and must include 5100 (at each offering during residency), 5160, 5140, and 5160 quarter hours at the 6000 level. In the thesis option, no more than 9 hours may be thesis courses. A final examination is required in both programs.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those persons who demonstrate proficiency in conducting independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program of study must include sufficient coursework within the department, but outside the areas of specialization, to give a broad foundation and understanding of the discipline. The program must include 5160, 5710, 5720, and (at each offering during residency) 5100. A minimum of 15 hours of credit must be earned in related fields outside the department.

COMPELLENT FOR GRADUATE STUDENT RESEARCHERS

1. A reading knowledge of French, German, Russian, or Spanish is required. The student's areas of specialization may be exceptions. The list will be Frans H. van den Berg of the University of Amsterdam unless otherwise approved by the student's faculty committee. Comprehensive examinations required for admission to candidacy in each of the student's areas of specialization must include written examinations on two special fields, and an oral examination on the student's major field, the special field, and the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the program as determined by the student's doctoral committee.

3410 Intermediate Economic Geography (3) Concepts, theories, and practices in location planning and service activities.

4310 Geography (4) Concepts and theories concerning development and signification of systems of cities and regional systems of the world. W

3450 Rural Geography (3) Geographical appraisal of rural areas of the United States, including agricultural and urban frontier problems and potential of rural area development.

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

3800 Climatology (3) General circulation systems leading to world pattern of climates. Climatic change and modification, Interrelationships of climate and human activity. W or Sp

3500 The Land-Surface System and Man (4) Nature and regional variations in relationships among surface form, water, vegetation, and surface materials. Humane as evaluators and agents of change. F, Su

3610 Cultural Geography (4) Major concepts of cultural geography with emphasis on specific world cultures or specific regions of the world. F

2410 Problems in Geographic Method (4) Examples of problems and approaches in geographic analysis and emphasis on correlation of geographic data, interpretation, generalization, classification, representation, and solutions of geographic problems. Sp

2799 Practicum in Cartography/Remote Sensing (3) Internship of 100 hr. in field application of course work toward registration. May be repeated. Maximum 6 hrs. F, Sp

5003 Non-Thesis Graduation Seminar (3-15) Required for non-thesis student not otherwise required during any quarter when such a student uses university facilities and/or faculty time before degree.
5100 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration at each offering required of registered graduate students. May be repeated. 8 hrs. S/NC only. E

5101 Foreign Study (1-12) See page 104. Preregistration required. Consent of instructor prior to registration. E

5200 Topics in Historical Geography (3) Examination of trends, concepts, and methods in historical geography. May be repeated. Consent of instructor. Maximum 9 hrs. A

5202 Topics in the Geography of the American South (3) Intensive analysis of problems and trends in one or more regions of the United States, excepting the states of New England and the Northwest. May be repeated with consent of instructor. Maximum 9 hrs. A

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

5260 Advanced Cultural Geography (3) Geographic perspective on economic and cultural conditions. Prerequisite: 3610 or consent of instructor. Maximum 9 hrs. A
departmental research, current research literature, and general topics. Registration at each offering required of registered graduate students. May be repeated. 8 hrs. S/NC only. W, Sp

5300 Advanced Topics in Geography (3) Reading and research on problems or topics of interest to individual students. Students must define topic and receive instructor approval of study plan before registering for course. Preregistration consent of instructor prior to registration. May be repeated with consent of instructor. E

5320 Topics in Subsurface Systems (3) Examination of trends, concepts, and methods in sub-surface systems. May be repeated. Consent of instructor. Maximum 9 hrs. A

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

5520 Advanced Seminar in Physical Geography (3) A seminar in physical geography. May be repeated with consent of instructor. Maximum 9 hrs. A

5550 Advanced Geographic Information Systems (3) Analytical and synthesize materials; practice in effective presentation of research findings. May be repeated. Consent of instructor. Maximum 9 hrs. A

5720 Topics in Cartography (3) Trends, concepts, problems, and methods in cartography. Prerequisite: 4730, or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5790 Topics in Cartography (3) Cartographic imaging for interpretation and mapping of geographic data. Prerequisite: 4100 or consent of instructor. A

5740 Advanced Topics in Remote Sensing (3) Applied research using remote sensing and aerial photographs or imagery for interpretation and mapping of geographic data. Prerequisite: 4100 or consent of instructor. A

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

6000 Doctoral Research and Dissertation (3-5) Preregistration required. May be repeated with consent of instructor. Maximum 60 hrs. E

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

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

6340-50 Seminar in Historical Geography (3, 3) A

6550-70 Seminar in Cultural Geography (3, 3) A
departmental research, current research literature, and general topics. Registration at each offering required of registered graduate students. May be repeated with consent of instructor. Maximum 9 hrs. A

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

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

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

5500 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen identification, chemical and x-ray methods of identification. Prerequisite: 3180 or consent of instructor. A

5610 Topics in Paleontology (3) Examination of trends, classification, and research on problems or topics of interest to individual students. Students must define topic and receive instructor approval of study plan before registering for course. Preregistration consent of instructor prior to registration. May be repeated with consent of instructor. E

5620 Advanced Seminar in Paleontology (3, 3) A

5630 Advanced Topics in Paleontology (3) Examination of trends, problems, and methods in paleontology. May be repeated. Consent of instructor. Maximum 9 hrs. A
doctoral examination, and a dissertation. The Department of Geology offers the M.S. and Ph.D. degrees in geology. Persons interested in these programs should contact the department.

The Department of Geology offers the M.S. and Ph.D. degrees in geology. Persons interested in these programs should contact the department.

For admission, an applicant must provide two rating forms or letters of recommendation, and GRE scores, including the subject examination in geology (or in another area if geology was not the area of previous university-level concentration). Students are not admitted under provisions or non-degree status. General course requirements for both degrees include:

1. At least one course in mineralogy, petrology, stratigraphy/sedimentation, paleoecology, structural geology, optical mineralogy, and field geology (normally taken in an undergraduate program).

2. A two-course introductory sequence in chemistry, calculus, and one of the following areas: statistics, botany, zoology, biology, physics (normally taken in an undergraduate program).

3. Geology 5610.

THE MASTER'S PROGRAM

Completion of the M.S. degree includes satisfactory performance on an oral qualifying examination during the second term, maintenance of a minimum B average in all graduate coursework, and successful defense of a thesis.

Course requirements include a minimum of 45 quarter hours of graduate credit that include no fewer than 24 hours in geology courses (18 or more at or above 5000 level and 9 hours of research). Attendance in a weekly seminar is required each quarter for not more than 3 hours S/NC credit toward the degree total. An oral qualifying exam and an oral defense of the thesis are required. Failure to pass the qualifying exam (a second opportunity may be granted by the department) or to achieve a 3.0 GPA for two successive quarters will terminate a student's candidacy.

THE DOCTORAL PROGRAM

Completion of the Ph.D. degree includes satisfactory performance on the comprehensive examination taken no later than the end of the second year, maintenance of a minimum B average in all graduate coursework, and successful defense of the dissertation. Course requirements include a minimum of 84 quarter hours of graduate credit and at least 36 hours of Dissertation 6000. At least 45 of the 84 hours must be at or above the 5000 level with a minimum of 15 hours in credit at the 5000 level. Up to one-third of required hours may be taken in related fields. Attendance in a weekly seminar is required each quarter for not more than 3 hours S/NC credit toward the degree total.

Each Ph.D. student must satisfy research requirements that must be approved by his/her faculty committee and which will consist of:

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 field of study.

c. Courses (minimum of 6 hours) at 3000 or 4000 level.

d. At least 36 hours of graduate credit are completed in appropriate mathematics, statistics, or computer science courses. The course must be taken during a student's graduate program and must be approved by the student's entire committee.

e. Option c. is available only to students who have had previous formal college-level reading experience in an appropriate foreign language.

A written and oral comprehensive examination and an oral defense of the dissertation are required. Failure to pass the comprehensive exam (a second opportunity may be granted by the department) or to achieve a 3.0 GPA for two successive quarters will terminate a student's candidacy.

*3180 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen identification, chemical and x-ray methods of identification, and rapid analysis using remote sensing and aerial photographs or imagery for interpretation and mapping of geographic data. Prerequisite: 4100 or consent of instructor. A

*May not be available for graduate credit for geology majors.
5635 X-Ray Diffraction: Single Crystal Techniques (3) Single crystal diffraction techniques, emphasis on precision and Weissenberg photography. Crystal symmetry and diffraction, reciprocal lattice and Ewald sphere construction, space group determination and systematic absences. 2 hrs and 2 lab. A.

5685 Thermodynamics for Geologists (3) Principles of chemical thermodynamics related to geological processes. ISEE 3140 and 3150, 3600 or equivalent. 3 hrs and 3 lab.

5690 Physical Geology (4, S) Theory and practice of geology as applied to earth's surface environments, including geoclimatology of natural waters, weathering reactions, and sedimentation. Prereq: Chemistry 1110-11-20: Chemistry 1150 may be taken with consent of instructor. Recommended: Physics 3050. 3 hrs and 1 lab.

5700 Advanced Paleontology (4) Fossil invertebrates.

5700 Paleontological Nomenclature and Techniques (4) Code of life science nomenclature as it applies to paleontology; basic techniques in preparation and presentation of paleontological material. Prereq: consent of instructor. 2 hrs and 2 manual work period.

5730 Stratigraphy and Sedimentology (4) Classification, distribution, characteristics and genesis of sedimentary strata and stratigraphic successions. Stratigraphic nomenclature. 2 hrs and 2 lab.

5750 Geologic Map Interpretation (4) Interpretation of geological maps. Map manipulation and interpretation of geologic terranes; mapping and interpretation in field exercises. Prereq: 4200 or consent of instructor. 2 hrs and 2 lab.

5760 Modern Mineral Deposits (4) Classification, distribution and geological processes related to the formation of mineral deposits. Prereq: consent of instructor. 2 hrs and 2 lab.

5770 Structural Geology (4) Interpretation of deformed rocks, map and section and field mapping, structural geology, structural analysis of metamorphic rocks, and the use of structural geology in petroleum exploration. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab.

5780 Metamorphic Petrology (4) Petrologic classification and thermobarometric and thermodynamic principles of metamorphism. Prereq: consent of instructor. 2 hrs and 2 lab.

5790 Stability of Rocks (4) Static and dynamic stability of rocks, effects of temperature and pressure on their stability. Prereq: 4200 or consent of instructor. 2 hrs and 2 lab.

5810 Advanced Paleobotany (4) Organic paleobotanical study and practice. Prereq: 4150 or consent of instructor. 2 hrs and 2 lab.

5820 Strata-bound and Stratiform Sulphide Deposits (4) Classification, distribution, characteristics and genesis of strata-bound and stratiform sulphide deposits. Mining of varieties of sulphide deposits. Development of a model for stratiform sulphide deposits. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab.

5830 Coal Depositional Environments (4) Coal strata and the processes that formed them. Emphasis on coal sequence analysis and the practical application to coal resource evaluation. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab.

5840 Ore Petrology (4) Ore mineral assemblages by phase equilibria, kinetics, geothermometers, barometers, and petrogenetic geothermometers. Prereq: consent of instructor. Recommended: 4510. 3 hrs and 1 lab.

5850 Regional Studies in Geology (1-3) Literature and general courses in specific areas of geology. May be repeated with approval of instructor. 2 hrs and 2 lab. Maximum 9 hrs.

5855 Aqueous Geochemistry (4) Introduction to and applications of equilibrium thermodynamics to earth surface environments, including geoclimatology of natural waters, weathering reactions, and sedimentation. Prereq: Chemistry 1110-11-20: Chemistry 1150 may be taken with consent of instructor. Recommended: Physics 3050. 3 hrs and 1 lab.


5860 Coal Depositional Environments (4) Coal strata and the processes that formed them. Emphasis on coal sequence analysis and the practical application to coal resource evaluation. Prereq: 4110 or consent of instructor. May be repeated with approval of instructor. Maximum 9 hrs.

5870 Regional Geomorphology (4) Process of landform development, emphasis on landform assemblages of landforms. May be repeated with approval of instructor. Maximum 4 hrs. Prereq: 3180 and 4550 or consent of instructor. 1 hr and 1 lab.

5915 Regional Geomorphology (4) Process Geomorphology (4) Process geomorphology. Prereq: 3180 and 4550 or consent of instructor. 1 hr and 1 lab.

5920 Process Geomorphology (4) Process Geomorphology (4) Process geomorphology. Prereq: consent of instructor. 1 hr and 1 lab.

5920 Process Geomorphology (4) Process Geomorphology (4) Process geomorphology. Prereq: consent of instructor. 1 hr and 1 lab.

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5920 Process Geomorphology (4) Process Geomorphology (4) Process geomorphology. Prereq: consent of instructor. 1 hr and 1 lab.
I. Ancient and Medieval

(1) Renaissance and Reformation

(2) Europe

(3) Rome

(4) Early Middle Ages, 375-1000

(5) Late Middle Ages, 1050-1500

II. Early Modern

(1) Renaissance and Reformation

(2) Europe, 1500-1650

(3) France, 1559-1815

(4) Latin America, 1559-1815

(5) Latin America, 1815-present

(6) East Asia, 1641-present

(7) Middle East, 1798-present

III. Modern

(1) English, 1485-1763

(2) Scotland, 1600-1700

(3) France, 1559-1815

(4) France, 1789-1914

(5) Germany, 1555-1806

(6) Germany, 1871-present

(7) Russia, 1600-1800

(8) Russia, 1815-present

(9) Colonialism and Imperialism

(10) Diplomatic History of the States

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.
The Mathematics Department has three graduate programs: (1) the Master of Mathematics degree, intended primarily for teachers of high school mathematics, (2) the Master of Arts and the Master of Science degrees, designed to prepare students for industrial employment and for teaching at the high school and junior college level, and (3) the Doctor of Philosophy degree, designed to prepare students for industrial employment and for college and university teaching and research. Contact the department office for additional information.

M A T H E M A T I C S P R O G R A M S

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

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

The following requirements must be met:
1. Completing 45 hours of course work, of which at least 9 must be at the 5000 level.
2. Passing a comprehensive examination upon completion of all course work.

A student may take as many of the written examinations a maximum of four times, and that credit be received for a 3-hour seminar or reading course (5990-5995) in which a term paper or project is required.

THE MASTER'S PROGRAMS

The department offers two options for these degrees. The first option requires a thesis for which 9 hours of additional work must be earned along with 36 additional hours of work in an area acceptable courses numbered above 4000. Of the additional hours, 9 may be in an area outside the department and 21 must be in courses in mathematics numbered above 5000.

After two quarters of graduate study, a student whose supervisory committee gives approval may choose his/herearlier examinations from the standard option and part 1 of the interdisciplinary mathematical ecology option.
but no one failing five exams, counting any one time, where \( n \) denotes the number of students. Students in the College of Education. Does not satisfy requirements of major or minor in mathematics. Honors versions of many standard topics such as elementary set theory, relations and functions, cardinality and continuity, functions, homeomorphisms, continua, and topological invariants. Must be taken in sequence. PreReq: 3150 or 4050. Graduate Committee. The exam is to be administered, administered, and graded by interested faculty, students, or the departmental head (though in all cases subject to the approval of the department head).

**3050 Elementary Probability and Statistical Analysis** (3) Prerequisites: Math 3050, 3060, 3090, 3100, 3110. This course is intended primarily for students preparing to take the Mathematical Ecology Exam. Topics covered include complex, integral, and rational roots, multiple integrals, and numerical approximations. Introduction to continuous and discrete systems. Quadratic forms and variational principles, related topics. Must be taken in sequence. PreReq: 3100 or 4120.

**3060 Linear Algebra** (3) Prerequisite: 3150. Graduate Committee. The exam is to be administered, administered, and graded by interested faculty, students, or the departmental head (though in all cases subject to the approval of the department head).

**3070-90 Introduction to Combinatorial Theory** (3) Prerequisite: acceptable for graduate credit. Such courses may be offered at the option of interested faculty, students, or the departmental head (though in all cases subject to the approval of the department head).

**3105 Elementary Mathematical Proofs** (3) Prerequisite: Math 3050, 3060, 3090, 3100, 3110. This course is intended primarily for students preparing to take the Mathematical Ecology Exam. Topics covered include complex, integral, and rational roots, multiple integrals, and numerical approximations. Introduction to continuous and discrete systems. Quadratic forms and variational principles, related topics. Must be taken in sequence. PreReq: 3100 or 4120.

**3120 Intermediate Analysis for Teachers** (3) Prerequisite: 3150 or 4050. (Same as Computer Science 4245.)

**3150 Introduction to Numerical Algorithms and Programming** (3) (Same as Computer Science 3151.)

**3160 Advanced Euclidean Geometry** (3) Prerequisite: 3150 or 4050. (Same as Computer Science 3151.)

**3170 Special Topics** (3) Includes special topics such as elementary set theory, relations and functions, cardinality and continuity, functions, homeomorphisms, continua, and topological invariants. Must be taken in sequence. PreReq: 3150 or 4120.

**3180 Logic and Sets** (3) Elements of mathematical logic. Elementary algebra. Principles for students preparing to take the Mathematical Ecology Exam. Topics covered include complex, integral, and rational roots, multiple integrals, and numerical approximations. Introduction to continuous and discrete systems. Quadratic forms and variational principles, related topics. Must be taken in sequence. PreReq: 3100 or 4120.

**3200 Non-Euclidean Geometry** (3) Foundations of geometry, and the theory and axioms of Euclidean space and its models. PreReq: 1 yr of college mathematics. W

**3225 Numerical Solution to Equations and Numerical Approximations** (3) Numerical solution to equations and numerical approximations. Introduction to convexity, inequalities, rounding errors. Solution of a single nonlinear equation; introduction to iterative methods for linear and nonlinear systems. Solution of linear systems of equations; linear approximations; polynomial interpolation; least squares; singular values. PreReq: 3150 or 4120.

**3250 Complex Numbers and Functions** (3) Complex numbers, Cauchy-Remann equation, holomorphic functions, Cauchy's integral theorem and formula, series expansions, residue theorem, zeroes and poles, entire functions, transcendental functions, singularities, branch cuts. PreReq: 3150 or 4120. (Same as Computer Science 4325.)

**3265 Numerical Methods for Ordinary Differential Equations** (3) Introduction to polynomials and piecewise polynomials, quadrature, single-step and multi-step methods for differential equations. Stability, consistency, convergence, and error analysis. PreReq: 3150 or 4120. (Same as Computer Science 4325.)

**3270 Theory of Equations** (3) Techniques for finding roots of polynomials. Topics covered include complex, integral, and rational roots, multiple integrals, and numerical approximations. Introduction to continuous and discrete systems. Quadratic forms and variational principles, related topics. Must be taken in sequence. PreReq: 3100 or 4120.

**3280-85 Advanced Mathematical Models in the Life Sciences** (3, 3) Topics covered include complex, integral, and rational roots, multiple integrals, and numerical approximations. Introduction to continuous and discrete systems. Quadratic forms and variational principles, related topics. Must be taken in sequence. PreReq: 3100 or 4120.

**3290-95 Advanced Topics in Mathematical Logic** (3, 3) Topics covered include complex, integral, and rational roots, multiple integrals, and numerical approximations. Introduction to continuous and discrete systems. Quadratic forms and variational principles, related topics. Must be taken in sequence. PreReq: 3100 or 4120.

**3300 Mathematical Models in the Life Sciences** (3) Introduction to difference equations and differential equations. Mathematical modeling techniques applied to biological phenomena. Topics include difference equations, systems of difference equations, and systems of differential equations. PreReq: 3150 or 4120.

**3305-10 Topology of Euclidean Spaces (3-3) Topics will include topology of line and plane, separation properties, connectedness, compactness, completeness, continuous functions, homeomorphisms, contractions, and topological invariants. Must be taken in sequence. PreReq: 3150, 3160, or consent of instructor. W, Sp

**3390 Studies in Mathematics (1-3) Credit determined at registration. Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

**4040-50 Matrix Algebra and Applications (3, 3) Vector spaces, linear transformations, eigenvalues and eigenvectors, similarity and unitary transformations, singular value decomposition, least square approximation, vector norms, linear transformations, linear independence, linear dependence, linear span and basis, linear functions, linear operators, linear functionals, linear forms, inner products, and dual spaces. PreReq: 3150, 3160, or consent of instructor.

**4050-60 Linear Algebra (3) Abstract vector spaces, linear transformations, and eigenvalues; similarity and unitary transformations, singular value decomposition, least square approximation, vector norms, linear transformations, linear independence, linear dependence, linear span and basis, linear functions, linear operators, linear functionals, inner products, and dual spaces. PreReq: 3150, 3160, or consent of instructor.

**4070-80 Ordinary Differential Equations (3, 3) Introduction to polynomials and piecewise polynomials, quadrature, single-step and multi-step methods for differential equations. Stability, consistency, convergence, and error analysis. PreReq: 3150 or 4120. (Same as Computer Science 4325.)

**4245 Numerical Linear Algebra** (3) Review of vector spaces, linear transformations, and eigenvalues; similarity and unitary transformations, singular value decomposition, least square approximation, vector norms, linear transformations, linear independence, linear dependence, linear span and basis, linear functions, linear operators, linear functionals. PreReq: 3150 or 4120. (Same as Computer Science 4324.)
5404: Infinite Series and Functions of Various Variables
(3) General theory, power series and Taylor's formula, uniform convergence, uniform expansion and maxima and minima for functions of several variables. LaGrange multipliers. Precept: 2850. 5405: Partial Differential Equations (3) Fourier series; Fourier transforms; the Cauchy-Riemann equations; Green's theorem; string solution, by series, heat flow. Boson formulas. Precept: 2840. 4510: Introduction to Analysis (3, 3, 3) First number system, sequences, limits, continuity, uniform continuity, differentiation, integration. Functions of several variables imply function theory. Multiple integrals, infinite series, sequences and series of differentiable functions, uniform convergence, Taylor series. Should be taken in sequence. Note: Credit will not be given for both 3503 and 4510.

5400: Calculus of Finite Differences (3) Real difference equations, application to problems in engineering and physics. Precept or coreq: 4510.

5405: Introduction to Mathematical Statistics

5410: Vector Analysis
(3) Fundamental operations, dot product, curl and cross products. Differential equations, divergence, curl, line, surface and volume integrals. Precept: 2860. 5415: Theory of Functions of a Real Variable (3, 3, 3) Continuity, derivative, limit, integration, uniform convergence, infinite series, existence of maxima and minima, Riemann integral, mean value theorems, Taylor's and Stieltjes theorem. Note: Credit will not be given for both 4530 and 4510.


5510: Foundations of Analysis (3) Development of the formal systems of natural, real, and complex number systems. Precept: 2860 or 2840.

5520: Theory of Functions of a Complex Variable (3, 3, 3) Complex numbers; limits; Cauchy's theorem; integration of functions of one complex variable; Cauchy's integral formula; infinite products and series. Precept: 2860 or 2840.
5710-50-75 Advanced Mathematical Statistics (3, 3, 3) Distribution functions and mathematical expec-

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

5900-50 Advanced Topology (3, 3, 3) Basic

5980-50-60 Mathematical Ecology (3, 3, 3) Discrete and continuous models in ecology. Population, com-

5990 Graduate Reading in Mathematics (1-3) Open
to graduate students, with consent of department. May be repeated for a total of 9 semester hours. Prereq: consent of instructor.

5991 Seminar Analysis (1-3)

5992 Seminar Topology (1-3)

5993 Seminar Algebra (1-3)

5994 Seminar Foundations (1-3)

5995 Seminar Applied Mathematics (1-3) May be taken for S1/0 or letter grade.

6000 Doctoral Research and Dissertation (3, 3) A program of advanced study under the direction of a faculty
member toward the end of the laboratory rotation program during the first quarter of the student's graduate career. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

The Graduate Programs: Each new gradu-
ate student meets with an advisor, usually the director of the Graduate Program in Mathematics, to plan a program of study for the first one or two
quarters before a research advisor is selected. This director advises the student in the selection of appropriate courses and to encourage creative and
independent thinking. Two to three calendar years are usually needed for the course of study which has the following requirements: (1) 45 hours including thesis credits, (2) a

6000 Doctoral Research and Dissertation (3, 3) Th
Required courses include (1) one year of organic, (2) one year of inorganic, (3) one year of analytical chemistry, (4) a year of physical chemistry. The student
may elect any other courses related to organic chemistry as approved by the major advisor. Prerequisite: 4210-10-20 or consent of instructor.


6070-50-70 Functional Analysis (3, 3, 3) Topological vector spaces, bounded linear transformations, basic


6090 Number Theory (3, 3, 3) Structure of groups, rings, ideals and modules, group actions, ideal theory, Dedekind domains. Prereq: 4910-20-30 or consent of instructor.


6190-20-30 Elementary Topology (3, 3, 3) Topologi-

6210-20-30 Functional Analysis (3, 3, 3) Topological vector spaces, bounded linear transformations, basic


6270-50-70 Probability Theory (3, 3, 3) Treatment of abstract probability theory in modern sense as branch of measure theory. Independence, conditional
probability, characteristic functions, moment generating functions, laws of large numbers, central limit theorem; linear regression, analysis of variance. Prereq: 4120 or 4910 and 4120-20-30 or 4910-20-30 or consent of instructor.

6310-20-30 Harmonic Analysis (3, 3, 3) Fourier series, Fourier transforms, Dirichlet's theorem, prime number theorem; linear independence of trigonometric

6370-50-70 Advanced Topology (3, 3, 3) Topologi-


6570-50-70 Probability Theory (3, 3, 3) Treatment of abstract probability theory in modern sense as branch of measure theory. Independence, conditional
probability, characteristic functions, moment generating functions, laws of large numbers, central limit theorem; linear regression, analysis of variance. Prereq: 4120 or 4910 and 4120-20-30 or 4910-20-30 or consent of instructor.

6650-50-70 Advanced Topology (3, 3, 3) Topologi-
3.0 GPA in all courses taken for graduate credit after 18 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one quarter as a teaching assistant; (4) two quarters of physical chemistry; (5) one quarter as a teaching assistant; (6) satisfactory performance in at least one quarter as a teaching assistant; (7) satisfactory performance in at least one quarter as a teaching assistant. Departments may set additional requirements to be satisfied by the candidate.

THE DOCTORAL PROGRAM

The purpose of the Ph.D. degree is to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a Bachelor's or Master's degree. A student who enters with a Bachelor's degree usually receives the Ph.D. after four or five years, those with a Master's degree usually take three or four years to complete the degree. Departmental requirements are:

1. A 3.0 GPA in all courses taken for graduate credit after 18 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one quarter as a teaching assistant; (4) two quarters of physical chemistry; (5) one quarter as a teaching assistant; (6) satisfactory performance in at least one quarter as a teaching assistant; (7) satisfactory performance in at least one quarter as a teaching assistant. Departments may set additional requirements to be satisfied by the candidate.

3810 Food Bacteriology (3) Standard methods for examination and cultivation of microorganisms associated with food fermentation and food spoilage. Prereq: 2919 or 3700 and Chemistry 2030 or 2031 Sp.

3303 Yeast and Mold (3) Morphology, taxonomy and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: 2919 or 3700; consent of Instructor. W.

4310 Taxonomy of Bacteria (3) Taxonomic classification. Prereq: 3700 or 3740. F.

410 Molecular Genetics (3) Transmission and expression of genetic information in the molecular level. Emphasis on bacterial and viral systems, but unique features of eukaryotic genetics systems are included. Prereq: 3303 or 3700; consent of Instructor. F.

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

4159 Experimental Microbial Ecology (3) Survey of techniques for assessment of microbial forms, functions and interactions in a variety of habitats. Prereq: 3519; consent of Instructor. (Same as Biochemistry 4110-20; Biochemistry 6420-21.) F.

4275 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation, complex and hypersensitivity, self, autoimmunity mechanisms, abnormalities of the immune system. Prereq: Biology 3130. (Same as Zoology 4720.) F.

4370 Advanced Topics in Immunology (Laboratory) Laboratory exercises designed to accompany 4275. Prereq: Consent of Instructor. F.

5230 Pathogenic Bacteriology (3) Disease producing microorganisms including bacteria, actinomycetes, and chlamydia. Prereq: 3200. W.

5233 Pathogenic Bacteriology Laboratory (2) Techniques for isolation, cultivation, and identification of pathogenic bacteria. Prereq: 3200; Consent of Instructor. W.

5235 Medical Mycology (3) Disease-causing fungi, morphology, physiology and pathogenesis of fungi. Emphasis on methodology of isolation and identification. Prereq: 3200. W.

5237 Medical Mycology Laboratory (3) Prereq: 3219; Consent of Instructor. Sp.

5240 Molecular Virology (3) Molecular aspects of the replication, expression and assembly of viruses, with emphasis on bacteriophage. Prereq: 3700. F.

5340 Medical Virology (3) General virology with emphasis on medical aspects. Prereq: 3200. W.

6330 Seminar in Microbial Genetics (1) May be repeated with consent of instructor. Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.


5315 Selected Topics in Microbial Research (3) Selected topics in diverse and laboratory methods for development and interpretation of microbial research. May be repeated. Consent of Instructor.


5360 Topics in Immunology and Immunoreactivity (3) Measles and related viral diseases, and their responses to antibodies. Prereq: Immunology 4270. F.

5400 Advanced Research Problems (1, 2, 3, 5) Consent of Instructor.

5720 Microbiological Genetics (5) Lectures and seminar dealing with current advances in bacterial genetics, including growth and cell structure. Prereq: Biology 4110-20. Consent of Instructor. F.

5755 Pathogenesis of infectious Disease (2) Host response to infection. Development of host-microbial interactions discussed in terms of individual microbial toxins, endotoxins, and other factors that cause disease. Emphasis on genetic and hormonal controls resulting from host genotypic progression. Prereq: 4275.

5870 The Oncogenic Viruses (3) Lectures and special laboratory exercises dealing with known tumor-inducing viruses. Prereq: 4420 or consent of instructor. F.

5878 The Viral Diseases (3) Lectures and discussions dealing with bacterial viruses with emphasis on the biological and chemical consequences of bacteriophage infection. Text supplied as readings from: Prentice 4420; and references. Consent of Instructor. F.

5170 Recent Advances in DNA History, principles and techniques of applications of recombinant DNA techniques. Basic concepts and basic methods of recombinant DNA techniques. Prereq: 4140 or consent of instructor.

5770 Recombinant DNA Laboratory (3) Practical details and procedures applicable to recombinant DNA methodology and techniques. Utilization of available vectors, experimental conditions and labeled nucleic acid hybridization. Prereq: 3770 and consent of instructor.

5810 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetics concepts (mutation, complementation, recombinability) at molecular level. Studies of lactose operon of Escherichia coli, 5410 and Biochemistry 4110-20 or consent of instructor.

9100-20-30 General Seminar (1, 1, 2) Review of current literature. May be repeated with consent of department. S/NC only. E.

10120 Doctoral Research and Dissertation (3-15) P/NC only. E.

10320 Microbial Physiology Laboratory (3) Related laboratory exercises dealing with physiological aspects of bacteria associated with food fermentation and food spoilage. Prereq: 2919 or 3700 and Chemistry 2200 or 2201 Sp.

10410 Bacterial Physiology Laboratory (3) Laboratory exercises for examination and cultivation of yeasts and molds. Prereq: 2919 or 3700 W.

11270 Immunology (3) Basic laboratory exercises for examination of bacteria associated with food fermentation and food spoilage. Prereq: 2919 or 3700. Consent of Instructor. W.

11275 Immunology Laboratory (2) Laboratory exercises for examination and cultivation of bacteria associated with food fermentation and food spoilage. Prereq: 2919 or 3700. Consent of Instructor. W.

11320 Yeast and Molds (3) Microbiology, taxonomy and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: 2919 or 3700; consent of Instructor. W.

12720 Advanced Immunology Laboratory (2) Laboratory exercises for examination and cultivation of yeasts and molds. Prereq: 2919 or 3700 W.

1510 Molecular Genetics Laboratory (Laboratory) Principles and methods of research in molecular genetics. Emphasis upon less frequently encountered species. Prereq: 3303 or 3700. Consent of Instructor. W.

1515 Concepts of immunity (3) Discussion and readings on current literature. May be repeated. Consent of Instructor. S/NC only. W.

1520 Microbial Physiology (3) Readings and discussions based on current literature. May be repeated. Consent of Instructor. W.

1522 Microbial Physiology Laboratory (3) Readings and discussions based on current literature. May be repeated. Consent of Instructor. W.

1525 Concepts of immunology (3) Discussion and readings based on current literature. May be repeated. Consent of Instructor. W.

1540 Seminar in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Consent of Instructor. S/NC only. F.

1545 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Consent of Instructor. S/NC only. F.

1550 Seminar in Microbial Physiology (2) Readings and discussions based on current literature. May be repeated. Consent of Instructor. S/NC only. F.

1561 Concepts of immunology (3) Discussion and readings on current advances in immunology and immunopathology. Consent of Instructor.

1599 Topics in Biological Medicine Research (1) (Same as Biochemistry 5970.) Consent of Instructor.

16720 Advanced Topics in Microbial Physiology (3) May be repeated with consent of instructor. Consent of Instructor.

16730 Advanced Topics in Microbial Pathogenesis (5) Prereq: 3770. May be repeated with consent of instructor. Consent of Instructor.

16740 Advanced Topics in Virology (3) Prereq: 4420 or 4420. May be repeated with consent of instructor. Consent of Instructor.

16750 Advanced Topics in Microbial Genetics (5) Prereq: 6340. May be repeated with consent of instructor.
THE MASTER OF MUSIC PROGRAM

The department requires a minimum of 45 quarter hours of coursework for the Master of Music degree. These hours are specifically distributed according to the area of concentration. All areas require course work in music history/literature and/or theory and analysis for elective courses. Music theory and composition require a thesis.

The choral conducting concentration requires a project and a seminar in choral performance. The instrumental conducting concentration requires a conducting performance and a seminar and practicum course sequence. All performance concentrations require a recital.

THE MASTER OF ARTS PROGRAM

The department requires a minimum of 45 quarter hours including 21 courses of coursework above the 5000 level and 9 hours of thesis.

A reading knowledge of French or German must be demonstrated by applicants before being admitted to candidacy.

3120 Orchestra (3) Advanced techniques in instrumental music with emphasis on using the concert orchestra. Prereq: 3120 or consent of instructor.

3230 The Symphony (3) Survey of symphonic literature from pre-classical to the contemporary period. May be repeated. Maximum 6 hrs.

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

For these degree programs the master's degree normally requires 45 quarter hours of coursework, 21 of which are required in the major concentration as prescribed by the department for all degree programs and elective courses must have the approval of the student's advisor. Each concentration requires a conducting performance and a seminar and practicum course sequence. All performance concentrations require a recital.

THE DEPARTMENT OF MUSIC


Music MAJOR

Music with consent of department. S/NC only.

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

6820-30-40 Independent Study (1, 1, 1) Independent study under the direction of the Coordinator of Graduate Studies. Consent of instructor required. May be repeated. Maximum 6 hrs.

4170 Evolution of Jazz (3) Study of origin, development and states of jazz music and its influences.

4203-40-50 The Organ and Its Literature (5, 3, 3) Development of organ and organ literature from Middle Ages to present; problems of style and interpretation. Prereq: consent of instructor; coreq: 2310-20-30 and consent of instructor.

4355 Keyboard Literature Before 1700 (5) Study of music for harpsichord and other keyboard instruments from the Renaissance period to the Baroque period. Prereq: consent of instructor.

4362-37-38 Advanced Piano Literature (2, 2, 2) Piano music for the pre-college level at present; Prereq: Consider of instructor.

4451 Styles in Opera Acting (2, 2) Study and practices of opera singing, acting techniques, historical and national characteristics. Prereq: 3120 or consent of instructor.

4495 Projects in Opera Theatre (1-3) Consider of instructor. May be repeated.

4530 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: Consent of instructor; coreq: 4199; Master's degree in Music.

4565-57-58 Elementary and Intermediate Piano Pedagogy (0, 0, 0) Piano methods and materials designed for teaching pre-college level students. Prereq: Consent of instructor.

4567 Advanced Choral Conducting (3) Development of conducting techniques; choral and changing meters. Prereq: 4500 or equivalent.

4574 Music in Christian Worship (3) History and philosophy of church music; liturgies and liturgical music in non-liturgical worship. Prereq: Consent of instructor.

4584 Church Music Methods and Administration (3) Prereq: Consent of instructor.


4650 Pedagogy of Music Theory (3) Techniques, methods, and materials. Prereq: Consent of instructor.

4751 Orchestral Conducting (3) Conducting techniques and preparation. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs.


4764 Concert Band Conducting (2) Study and application of techniques employed in preparing for concert band performance. Prereq: 3-year orchestra experience.

4775 tubing band conducting (2) Study and application of techniques employed in preparing for concert band performance. Prereq: 3-year orchestra experience.

4774, 4775, 4776, 4777 Choral conducting, instrumental conducting, Suzuki string techniques, church music and piano pedagogy and literature, and the Master of Arts with a major in Music with concentrations in theory and musicology.

College Of Liberal Arts/Music 133
5001 Project in Choral Conducting Performance (1-3) Choral ensembles. Prerequisites: Consent of instructor. May be repeated. Consent of instructor only.

5002 Non-Thesis Graduation Completion (1-15) Project. Prerequisites: Consent of instructor. May be repeated. Consent of instructor.

5003 Church Music Performance Project (1-3) May be repeated. Maximum: 3 hrs.

5101 Organ Literature Seminar (3) Topics vary. Prerequisites: Consent of instructor.

5102-22-32 Pedagogy of Voice (2, 2, 2) 5012—Singers. 5012-22: aural perception and diction; 5022—Instruction and supervision. 5032—Special problems in vocal categories and levels of study. Special problems in vocal categories and levels of study. Consent of instructor only.

5200 Piano Literature Seminar (3) Topics vary. Prerequisites: Consent of instructor.

5221 Analytical Techniques (3) Analytical techniques. Prerequisites: Consent of instructor. May be repeated. Consent of instructor. May be repeated.

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

5361-71 Ethnomusicology (3, 3) Attitudes and techniques of ethnomusicology. Survey of music cultures throughout the world. Interview and transcription projects. Consent of instructor.

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

5600 Independent Study in Music History and Literature (1-9) Prerequisites: Consent of instructor. Consent of department head.

5730 Thesis (1-15) P/NP only. E

5901 Project in Choral Conducting Performance (1-3) Public performance: document; recording project. May be repeated. Consent of instructor.

5902 Non-Thesis Graduation Completion (1-15) Required for the non-thesis student not otherwise registered for a final quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only.
THE DOCTORAL PROGRAM

Specific requirements for doctoral stu-
dents in Philosophy include a minimum of
three academic years or graduate study
involving at least 72 quarter hours credit in
course work (normally 18 quarter courses
or their equivalent, exclusive of credit for the
thesis and dissertation) of which no fewer
than 45 hours shall be in courses numbered
above 5597. The specific number and distri-
bution of courses will be determined by the
student's faculty committee.

Doctoral students must demonstrate com-
petency in one foreign language, normally
French or German. This may be done by
passing the doctoral language examina-
tion administered by the Romance Language
or German Departments, or by passing French
3030 or German 3030 with a B or better.
In special circumstances and upon petition by
the student, the department's graduate
committee may approve a substitute language
for French or German.

MEDICAL ETHICS

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

RELIGIOUS STUDIES

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

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

Registration in any course in the 5000 or
6000 series (except 5597) may be repeated
for credit with the consent of the depart-
ment. That is, courses having the same
number, but with different subject matter,
may be taken with each separate subject
description.

3111 Ancient Western Philosophy (4) F, W

3121 Medieval Philosophy (4) F, Sp

3141 Renaissance- and Eighteenth-century Phil-
osophy (4) E

3142 Eighteenth-century Philosophy (4) F, W

3161 Contemporary Philosophy (4) Survey of recent
developments in modern philosophy.

3200 Modern and Theological Thought (4)
(Same as Religious Studies 3200 and Russian
3270.)

3311-12 American Philosophy (4) F, W—
Cultural and historical perspectives on
American thought in the 20th century.

3320 Philosophy of Law (4) Nature, sources, func-
tion of law. A

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

3340 Philosophical Ideas in Literature (4) Philosoph-
ical ideas in English literature and represen-
tations in major literary works.

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

3430 The Concept of Woman (4) Nature of woman
as conceived by major western philosophers from
Plato to Simone de Beauvoir. (Same as Women's
Studies 3430.) F, W

3440 Ethics and Society (4) Moral issues of U.S.
social policy: abortion, euthanasia, death penalty,
reverse discrimination.

3510 Kleinian Italian (4) E

3550 Marxism as Philosophy (4) W

3560 Business Ethics (4) Ethical problems as they
confront both business as social institution and
individuals in business. May not be taken for
graduate credit by philosophy majors. Sp

3565-69 Professional Responsibility (4, 4, 4, 4, 4)
Critical analysis of selected classic texts from philos-
ophy, religious studies, and social sciences; nature
of responsibility, professionalization, and applica-
tions of concepts of responsible and professional activity.
In-
troductions to various of professional fields of practice
3600—Application of theoretical principles and ana-
sis skills developed in 3560 to selected case studies and
other detailed descriptions of professional prac-
tice from following professional fields: Engineering
Architecture; Business/Accounting; and Law and
other professional fields. (Same as Religious
Work, Human Services, Religious Ministry) 10-
Teaching. (Same as Religious Studies 3605-06.)

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

3655 Buddhist Philosophy and Religion (4) (Same as
Religious Studies 3655.) W

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

3680 Philosophy of Religion (4) Analysis of basic
issues of religion. (Unan. Religious Studies 3680.)
F, Sp; Su

3720 Science, Technology, and the Modern World; A
Philosophical Approach (4) Nature and limits of
scientific method, its impact on society.

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

3770 Introduction to Philosophy of Science (4)
Stanford approach in philosophy of science:
methods, nature of laws and theories, problems of induction,
explanation, measurement. No background in logic
presupposed.

3810 Introductory Symbolic Logic (4) Techniques for
reasoning (propositional and quantification
logic and quantification theory.) F

3910 Contemporary Aesthetics (4) Philosophical dis-
Cussion of contemporary art. F, W, F

400 Special Topics (4) A student- or instructor-
initiated course to be offered when department and
department head determine that the course is
beneath the graduate department. May be repeated.
May be repeated.

4111—21 Modern Religious Philosophies (4, 4) Nature
and limits of religious studies.

4200 Classical Indian System of Philosophy; The
Moksha Tradition (4) (Same as Religious Studies 4200.)

4350 Intermediate Ethics (4) Topics in metaethics or
ethics. F

4370 Theoretical Issues in Medical Ethics (4) Prereg.
3301 or 3601 or consent of instructor. (Same as Reli-
gious Studies 4370.) F

4410 Plato (4) Preup. 4 hrs philosophy or consent of
instructor. A

4420 Aristotle (4) Preup. 8 hrs philosophy or coin-
test of instructor. A

4450 Critical Rationalism (4) Prereg. 8 hrs philosophy
or consent of instructor. A
4480 Philosophy (4) Prereq: 8 hrs philosophy or consent of instructor.

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

4460 Advanced Topics in Existentialism and Phenomenology (4) Prereq: 8 hrs philosophy or consent of instructor.

4512 Logical Analysis of Language (4) Prereq: Consent of instructor. May be repeated.

4260 Philosophy of Mind (4) Problems of mind and body in relation to consciousness and personal identity. Prereq: 8 hrs philosophy or consent of instructor.

4365 Philosophy of Language (4) Prereq: 8 hrs philosophy or consent of instructor.

4710 Philosophy of Natural Science (4) Consideration of standard topics pertinent to natural science including reduction of theories and teleological explanation. Familiarity with symbolic logic is recommended. Prereq: 3710 or 2 yrs natural science.

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

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

5000 Thesis (1-15) PHIL only. 

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

5050 Symbolic Logic (4) 

5060 Philosophy of Logic (4) Nature of logic; epistemological, metaphysical and ethical assumptions and implications in various theories of logic. Prereq: 4510 or consent of instructor.

5101 Foreign Study (1-12) See page 104. 

5102 Off-campus Study (1-12) See page 104. 

5103 Independent Study (1-12) See page 104. 


5200 Studies in the History of American Philosophy (4) Intensive, critical work on major philosophers or schools.

5310-20-30 Studies in Value and Normative Theories (4, 4, 4) 5310—Axiology. 5320—Ethics and methodology of social science. 5330—Ethics and methodology of social science. 

5350 Orientation to Medical Ethics (4) Survey of ethical theories in application to issues in medical ethics. Consent of Medical Ethics Committee required. (Same as Religious Studies 5365.) 

5365 Applied Ethical Theory (4) Single author, traditional or logical ethical theories with special attention to application to issues in business, science, technology, ecology, and other practical fields. (Same as Religious Studies 5365.) W

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

5373 Advanced Topics in Medical Ethics (4) Prereq: 5370 or consent of Medical Ethics Committee.

5374 Seminar in Philosophy of Science (4) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

5400 Clinical Practice in Medical Ethics (1-20) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

5600 Doctoral Research and Dissertation (3-15) Prereq: 5370 or 3310. May be repeated. 

6151-20-30 Seminars in the History of European Philosophy (4, 4) 

6150 Seminars in the History of American Philosophy (4) 

6151 Seminar in the Philosophy of Religion (4) 

6160 Seminar in the Philosophy of Science (4) 

6270 Advanced Topics in Medical Ethics (4) Prereq: 5370 or consent of Medical Ethics Committee.

6301 Seminar in Epistemology (4) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

6309 Seminar in the Philosophy of Science (4) 

6350 Advanced Seminar in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

*MAJOR DEGREES

Physics

M.S., Ph.D.

Professors:


Associate Professors:


*Acumen Distinguished Professor

Space Institute, Tulane.

*Emeritus/Retired, Science Alliance Center of Excellence.

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

Departmental graduate programs providing special opportunities for academic work are also available in the areas of atmospheric and space flight research at the Space Institute, Tulane.

For additional information, contact the Dean's Office.

Admission Requirements: A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics must complete an undergraduate major in physics or its equivalent. Physics 3110-20, 3310-20, 3710-20, 4110-20, 4240 and 5000 constitute the minimum courses prerequisite to graduate study. A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in physics or its equivalent. Physics 3110-20 and 3310-20 constitute the minimum course work prerequisite to graduate study. All first-year graduate students are required, for advising purposes only, to take a qualifying examination in graduate astronomy during the fall quarter registration period.

THE MASTER'S PROGRAM

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

Departmental graduate programs providing special opportunities for academic work are also available in the areas of atmospheric and space flight research at the Space Institute, Tulane.

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THE MASTER'S PROGRAM

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

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THE MASTER'S PROGRAM
the satisfactory completion of 45 hours of

5610-20, 6110-20-30, and either 6310 or 5720; Physics 4510, 4610-20-30, 5210-20-30, and either 6310 or 5720; Chemistry 4160-70, 5430, and any two

4590 Magnetic Induction Phenomena (3) Theory and

7050 Graduate Research Participation (3) Advanced

4580 Magnetic Induction Phenomena (3) Theory and
counterparts. Magnetic fields of current and quasistatic problems. Maxwell's field equations; their solutions
dielectric and conducting media; guided waves.

4540-50 Experimental Nuclear and Radiation Physics

4230-40 Modern Optics (4,4) Modern Optics 4230

5002 Non-Thesis Graduation Completion (3-15)

College Of Liberal Arts/Physics And Astronomy

5000 Thesis (1-15) P/NP only.

5100-20 Advanced Introduction to Theoretical Physics

4370 Advanced Quantum Mechanics (3,3) Advanced

4010 Background of Physics (3) Survey of historical
crystal structure, lattice dynamics, specific heat,
4560-70 Acoustics (3,3) Wave propagation in solids,

4510-20-30 Introduction to Quantum Mechanics (3, 3

4010 Physical Acoustics (4) Considerations funda-

5430 or equivalent. 2 hrs and

30, 3310-20, differentialequations. Must be

4540 Experimental Methods of Infrared and Raman

4250-40 Geometrical Optics (3,3) Geometrical

4500 Foundation of Physics (3) Selected topics from

4520 Forestry of Physics (3) Survey of modern
differential equations and their associated boundary

5080 Graduate Research Participation (3) Advanced

5010-20-30 Non-Thesis Graduation Completion (3-15)

4240-50 Geometrical Optics (3,3) Geometrical

4510-20-30 Introduction to Quantum Mechanics (3,3

4200-30-20-30 General Physics (2,2,2) 4200-20-30

30 of hours from courses numbered above 5000; 9 hours in a minor field; and 9 hours from other courses in

2140 Applied Thermodynamics (3) Applied

3700-20-30 Introduction to Atomic and Nuclear Phys-

3730 or equivalent. 2 hrs and 3 lab. hrs.

4560-50 Experimental Nuclear and Radiation Physics

4670 Electron Band Theory, Transport Properties, Opti-

5210-20-30 Advanced Modern Physics (3,3,3) Basic

4250-40 Geometrical Optics (3,3) Geometrical

5080 Graduate Research Participation (3) Advanced

5210-20-30 Advanced Modern Physics (3,3,3) Basic

3420-40 Dielectricsmagnetostatics and steady-current

4350-40 Electromagnetic Radiation (3,3) Electromag-

4500 Foundation of Physics (3) Selected topics from

4500 Foundation of Physics (3) Selected topics from

30, 3310-20. Prereq: 3230 or equivalent.

5010-20-30 Non-Thesis Graduation Completion (3-15)

5210-20-30 Advanced Modern Physics (3,3,3) Basic

4660-70 Solid State Physics (3,3) Symmetry

3100-10-30, 3200-10-30. 3 hrs or 5 hrs; 3 lab. hrs.

3110-10-30, 3200-10-30. 3 hrs or 5 hrs; 3 lab. hrs.

2140 Applied Thermodynamics (3) Applied

5310-20-30, 5320-20-30, 5330-20-30, 5340-20-30, 5350-

5210-20-30 Advanced Modern Physics (3,3,3) Basic

Physics 3200 with a grade of B or B+ may be

5000 Thesis (1-15) P/NP only.

2330 Wave Motion (3) Wave motion in fluids,

3720 or equivalent. 2 hrs and

4590 Magnetic Induction Phenomena (3) Theory and

4230-40 Geometrical Optics (3,3) Geometrical

4510-20-30 Introduction to Quantum Mechanics (3,3

4500 Foundation of Physics (3) Selected topics from

5002 Non-Thesis Graduation Completion (3-15)

4250-40 Geometrical Optics (3,3) Geometrical

4520 Forestry of Physics (3) Survey of modern
differential equations and their associated boundary

2350 or equivalent. 2 hrs and

4230-40 Geometrical Optics (3,3) Geometrical

4500 Foundation of Physics (3) Selected topics from

5240-50 Advanced Quantum Mechanics (3,3) Advanced

4240-50 Geometrical Optics (3,3) Geometrical

4500 Foundation of Physics (3) Selected topics from

Physics 6700-20-30 of students specializing in nuclear physics, Physics 6710-20-30 of stu-

5240-50 Advanced Quantum Mechanics (3,3) Advanced

2461 or equivalent. 2 hrs and

4540 Experimental Methods of Infrared and Raman

5010-20-30 Non-Thesis Graduation Completion (3-15)

5002 Non-Thesis Graduation Completion (3-15)

4230-40 Geometrical Optics (3,3) Geometrical

3230 or equivalent. 2 hrs and

5002 Non-Thesis Graduation Completion (3-15)

2330 Wave Motion (3) Wave motion in fluids,

3720 or equivalent. 2 hrs and

4500 Foundation of Physics (3) Selected topics from

5002 Non-Thesis Graduation Completion (3-15)

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3720 or equivalent. 2 hrs and

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3720 or equivalent. 2 hrs and

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3720 or equivalent. 2 hrs and

4500 Foundation of Physics (3) Selected topics from

5002 Non-Thesis Graduation Completion (3-15)

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3720 or equivalent. 2 hrs and

4500 Foundation of Physics (3) Selected topics from

5002 Non-Thesis Graduation Completion (3-15)

2330 Wave Motion (3) Wave motion in fluids,

3720 or equivalent. 2 hrs and

4500 Foundation of Physics (3) Selected topics from

5002 Non-Thesis Graduation Completion (3-15)

2330 Wave Motion (3) Wave motion in fluids,

6575 Physics of Polymers and Molecules (3) Introduction to the fundamental laws and principles of molecular physics and electronic structure of matter. Properties of plastics.

6726 Introduction to High Energy Physics (3) Basic concepts of particle physics, elementary particles, and superconductivity. hands-on experience with equipment for high energy physics research.

6930-39 Special Projects (3, 3) Special projects in physics. May be repeated with different content. Consent of instructor.

6990-30 Thesis (1-3) Major thesis or project on a topic of special interest to the student. May be repeated with different content. Consent of instructor.

8000 Doctoral Research and Dissertation (3-5) Ph.D. dissertation. May be repeated with different content. Consent of instructor.

8110-30 Quantum Mechanics (3, 3) Fundamental principles of quantum mechanics and application to realistic problems. Survey of the mathematics of quantum mechanics.

8310-30 Nuclear Structure (3, 3) Theory of nuclear structure, nuclear models, and nuclear reactions. May be repeated with different content. Consent of instructor.

8320-30 Structure of Atoms and Molecules (3, 3) Quantum mechanics of atomic and molecular systems. Wave mechanics, perturbation theory, and computational methods in molecular physics.

8510-30-30 Topics in Current Research (3, 3) Research topics in physics. May be repeated with different content. Consent of instructor.

8620 Interaction of Electrons with Solids (3) Elements of solid state physics, including electronic properties of solids, electronic band structure, and solid state electronic devices. May be repeated with different content. Consent of instructor.

8630 Interaction of Radiation with Matter (3) Topics in atomic physics. Quantum mechanics of radiation and matter, including atomic and molecular spectroscopy. May be repeated with different content. Consent of instructor.

9010-30 Advanced Solid State Physics (3, 3) Quantum mechanics, statistical mechanics, and solid state physics. May be repeated with different content. Consent of instructor.

9081 Vibration and Relaxation in Solids (3) Vibration and relaxation processes in solids. Applications to the study of low-dimensional systems.

9130-30 Topics in Current Research (3, 3) Research topics in physics. May be repeated with different content. Consent of instructor.

5310-20-30 General Relativity (3, 3) Tensor calculus, general relativity. May be repeated with different content. Consent of instructor.

5410-30 Advanced Topics in Classical Theory (3, 3) Advanced topics in classical physics. May be repeated with different content. Consent of instructor.

6310 Electromagnetic Theory of Light (3) Theoretical aspects of electromagnetic theory and applications. May be repeated with different content. Consent of instructor.

6510-30 Molecular Spectroscopy (3, 3) Molecular spectroscopy, molecular structure and electronic energy levels. May be repeated with different content. Consent of instructor.

6520-30 Nuclear Structure (3, 3) Theory of nuclear structure, nuclear models, and nuclear reactions. May be repeated with different content. Consent of instructor.

6530-30 Nuclear Reactions (3, 3) Theory of nuclear reactions, nuclear models, and nuclear structure. May be repeated with different content. Consent of instructor.

6540-30-30 Topics in Current Research (3, 3) Research topics in physics. May be repeated with different content. Consent of instructor.

6550-30 Solid State Physics (3, 3) Solid state physics, including topics of current interest in solid state physics. May be repeated with different content. Consent of instructor.
3625 Latin American Government and Politics (4, 4) F
3615-16 Dynamics of Black African Politics (4, 4) F, Sp
3605 Political Change in Developing Areas (4) Characteristics and problems of potential changes with primary focus on developing areas. F, Sp

2510-20 .F, W, Sp
2500 Administrative Responsibility. Recommended prereq: 2510-20. Sp ; W
2530 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W
2510-20 .F, W, Sp
2550 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W
2510-20 .F, W, Sp
2550 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W
2510-20 .F, W, Sp
2550 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W
2510-20 .F, W, Sp
2550 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W
2510-20 .F, W, Sp
2550 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W
2510-20 .F, W, Sp
2550 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W
2510-20 .F, W, Sp
2550 Characteristics and problems of state government. F, Sp
2520-21 The State (4, 4) F, W

3801 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought. F
3802 Studies in Medieval Political Thought (4) From Augustine to Luther: emphasis on problems and policies in metropolitan areas. F, Sp
3803 Studies in Modern Political Thought (4) Industrialism through the Enlightenment. W
3804 Studies in Nineteenth- and Twentieth-Century Political Thought (4) Political theories of industrial and technological societies, nineteenth and twentieth century. F
3805 American Political Thought (4) Examination of roles of selected political ideas, doctrines, and themes in America, emphasizing their development and relationships to diverse political interests. W
4000 Revolution (4) Characteristics, theories, and consequences of revolution, with particular focus on self-regulating revolutions and movements. Sp
4010 Law and the Administrative Process (4) Powers of, procedures of, controls over administrators. F
4020-30 Political Attitudes, Opinions and Communication (4) Nature, function, and processes of political decision making. Recommended prereq: 2510-20. Sp, W
4020-30 Political Attitudes, Opinions and Communication (4) Nature, function, and processes of political decision making. Recommended prereq: 2510-20. Sp, W
4020-30 Political Attitudes, Opinions and Communication (4) Nature, function, and processes of political decision making. Recommended prereq: 2510-20. Sp, W
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4020-30 Political Attitudes, Opinions and Communication (4) Nature, function, and processes of political decision making. Recommended prereq: 2510-20. Sp, W

139
THEODORE S. FREEMAN

Psychology

Psychology is the study of thought and behavior. It is a broad field that encompasses a wide range of topics, including the analysis of human and animal behavior, the science of learning, and the study of mental processes such as perception, memory, and decision-making. Psychology is a discipline that seeks to understand the behavior of individuals and how behavior is influenced by various factors, including genetics, the environment, and personal experiences.

The Psychology Department at [University Name] offers a variety of undergraduate and graduate programs in psychology. The undergraduate program provides a solid foundation in psychology and prepares students for a variety of careers or further study. The graduate program offers opportunities for students to pursue advanced study in psychology.

The Psychology Department at [University Name] is committed to excellence in teaching and research. Faculty members are active in research, and students have opportunities to participate in research projects. The department is also dedicated to providing a supportive and inclusive environment for all students.

[University Name] Psychology Department

[Address]
5111 Seminar in Current Issues in School Psychology (3) Prereq: Graduate standing or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

5140-55-60 Psychobiological Assessment (3, 3, 3) Prereq: 3210, 3120, 5120, or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

5450 Quantitative Methods in Psychology (3) Prereq: 5100 or equivalent. May be repeated. Maximum 12 hrs. S/NC only.


5769 Advanced Techniques in Psychological Physiology (3) Prereq: 4170, 4179, and consent of instructor. May be repeated. Maximum 18 hrs. S/NC only.


5810 Interpersonal Assessment (3) Prereq: 4710, 4719, or consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.


6025 Internship in Community Psychology (3, 3, 3) Prereq: 5140-50-60, 5150, or consent of instructor. May be repeated. Maximum 18 hrs. S/NC only.

6030 Seminar on Methods of Social Research (3) Prereq: 3210, 3120, 5120, or Educational Psychology 3730. May be used for credit in psychology or social biology.

6050 Seminar on Methods of Social Research (3) Prereq: 3210, 3120, 5120, or Educational Psychology 3730. May be used for credit in psychology or social biology.

6060 Seminar in Psychological Concepts (3) Prereq: 3210, 3120, 5120, or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6070 Seminar in Psychological Concepts (3) Prereq: 3210, 3120, 5120, or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6150 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.
4619 Field Placement (1-4) Required of all students second year and beyond in full-time residence in the clinical training program. May be repeated. Maxi- mum 24 hrs. S/NC only.
4692 Psychology Clinic Placement (1-4) Required of students assigned to Psychology Clinic. May be repeat- ed. Maximum 24 hrs. S/NC only.
4693 Advanced Clinical Activity (1-4) May be repeated. Maximum 12 hrs. S/NC only.
4694 Field Experience in Clinical Psychology (1-4) For students who have finished internship with place- ment in clinical psychology in local area. May be repeated. Maximum 12 hrs. S/NC only.
4590 Seminar in Psychopathology (3) Seminar: for advanced graduate students in psychodynamics or quan- titative 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.
5500 Professional degree in field related to mental health; topic and format to be announced. Prereq: 5500. May be repeated. Maximum 9 hrs.
5520 Seminar on Changing Concepts in Clinical Psychology (3) New developments in field in relation to their impact on experimentation and systems of thought. Prereq: M.A. in psychology or equivalent.
4590 Seminar in Psychopathology (3) Prereq: Cons- ent of instructor.
4611 Seminar in Group Processes (2) Theory and practice of group therapy. Prereq: Permission of instructor. Admission to Clinical Training Program or consent of instructor.
4592 Seminar in Behavior Modification (3) Practical applications of systematic desensitization, operant conditioning, aversive conditioning and related techniques for modification of behavior. Prereq: Permission of instructor.
4593 Seminar in Techniques of Behavior Modification (3) Practical applications of systematic desensitization, operant conditioning, aversive conditioning and related techniques for modification of behavior. Prereq: Admission to Clinical Training Program or consent of instructor.
4597 Seminar in Metabolic and Family Therapy (3) Evaluating the development and application of hypothesis. Prereq: Permission of instructor.
4598 Assessment Laboratory (1-3) Prereq: C 5890, 5891, or 5892. May be repeated. Maximum 12 hrs.
4599 Psychotherapy Practice (1) Coreq: 4914-20- 30. May be repeated: Maximum 13 hours.
4590-45 Advanced Psychometrics (3, 3) Construct design, statistical procedures, methods of investigation, psychometrics, behavioral, and sys- tems-theory concepts, Prereq: Admission to the Clinical Psychology Program.
4614 Introduction to Psychosomatic Psychotherapy (3) Prereq: Consent of instructor.
4622 Assessment Laboratory (2) Coreqs: 5890, 5891, or 5892. May be repeated: Maximum 12 hrs.
4594 Psychotherapy Practice (1) Coreq: 4914-20- 30. May be repeated: Maximum 13 hrs.
4690 Continuing Education in Professional Mental Health (1-4) Topics of interest to persons in mental health fields and other fields. Weekly seminar, or sev- eral seminars, in professional development in field related to mental health or career development of instructor. May be repeated. Maximum 9 hrs.
4691 Field Placement (1-4) Required of all students second year and beyond in full-time residence in the clinical training program. May be repeated. Maxi- mum 24 hrs. S/NC only.
4692 Psychology Clinic Placement (1-4) Required of students assigned to Psychology Clinic. May be repeat- ed. Maximum 24 hrs. S/NC only.
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4611 Seminar in Group Processes (2) Theory and practice of group therapy. Prereq: Permission of instructor. Admission to Clinical Training Program or consent of instructor.
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5590 Seminar in Psychopathology (3) Seminar: for advanced graduate students in psychodynamics or quan- titative 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.
5500 Professional degree in field related to mental health; topic and format to be announced. Prereq: 5500. May be repeated. Maximum 9 hrs.
4840 Readings in Selected Languages Related to Religious Studies (3-4) Prereg: Consent of instructor. May be repeated. Maximum 12 hrs.

4841 Sociology of Religion (4) (Same as Sociology 4940)

5101 Foreign Study (1-12) See page 104.
5102 Off-campus Study (1-12) See page 104.

5103 Independent Study (1-12) See page 104.

5310-32 Topics in Religion and Society (4, 4) (Same as Philosophy 5305).

5350 Determination to Medical Ethics (4) (Same as Philosophy 5355).

5510-20 Topics in the History of Religion (4, 4)

5560 Topics in Afro-American History (4) (Same as History 5560).

5710-20 Topics in Religious Thought (4, 4)

Romance LANGUAGES

MAJORS

French

M.A. and Ph.D.

Professors: R. H. Peter, Ph.D. Florida State; J. E. Barett, Ph.D. California (Berkeley); W. F. C. Czogiel, Ph.D. Indiana; W. B. Field, Ph.D. Indiana; W. A. G. Little, Ph.D. Minnesota; and F. G. W. Field, Ph.D. Harvard.

Associate Professors: J. C. S. Kellaway, Ph.D. Indiana; J. R. Marjoribanks, Ph.D. Indiana; J. D. Barnes, Ph.D. Indiana; L. M. McMillan, Ph.D. Indiana; and W. R. Capone, Ph.D. Indiana.

Assistant Professors: E. J. H. Carter, Ph.D. Indiana; R. F. Weisberg, Ph.D. Indiana; J. J. J. Campbell, Ph.D. Indiana; A. G. D. Kit; Ph.D. Indiana; and W. D. Head, Ph.D. Indiana.

The Department of Romance Languages offers two advanced degrees: the Master of Arts (M.A.) in French and Spanish; and the Doctor of Philosophy (Ph.D.) in Spanish. Information should be obtained from the Head of the Department.

THE MASTER'S PROGRAM

Thesis Option:

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), should be divided into a major and minor (French-Italian, Spanish-Portuguese, etc.), at least 27 hours must be taken in the major.


3. A written examination covering the course work and selected items from a master reading list.

4. A final oral examination covering the thesis.

Non-Thesis Option:

1. Completion of 45 quarter credits of which at least 36 must be in courses numbered above 5000, including 5011 (French or Spanish, as appropriate). At least 24 quarter hours of which 18 must be in courses which chooses to divide his/her work into a major and minor (French-Italian, Spanish-Portuguese, etc.), at least 36 hours must be taken in the major.

2. Three term papers that have been accepted as satisfactory by the Advisory Committee.

THE DOCTORAL PROGRAM

Course Work and Residence: A dissertation (36 credit hours) and minimum of 81 credit hours in coursework beyond the Bachelor's degree (or its equivalent) is required; maximum of 12 hours may be taken in courses at the 4000 level and the rest in courses above 5000. Including a minimum of 18 hours in courses above 6000. All students must complete the exams in methods of research (5151-61-71) for a total of 3 credits. No fewer than 54 quarter hours should be taken in courses pertaining to the student's major field. 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 specialization. In addition, 9 hours of courses above 4000 in a related discipline are required. This 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, or others to which the student has had access in accordance with the student's field of concentration. Proficiency in Latin shall be required of all students specializing in an area related to philology or the medieval period.

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

French

3010-30-33 Elements of French for Upper Division and Graduate Students (3, 3, 3). Elements of language, literature, and culture, and general courses in French are required of all students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No auditors. F; W; Sp.

4001-02-03 Introduction to Consecutive and Simultaneous French Translation (3, 3, 3) Oral and written translation to and from English. 4002—Consecutive translation to and from English. Training of students with intermediate or advanced knowledge of French for consecutive and simultaneous oral translation from French into English, and vice versa on a variety of practical subjects. Required of all students preparing for the Master's and Ph.D. degrees. Two years of course work recommended. Consent of instructor required.

5011 Techniques in Literary Analysis (3) Required of all M.A. and Ph.D. students. (Same as German, Russian, Spanish, and Linguistics 5250). F

4100 Masterpieces of French Drama in English Translation (3) No foreign language credit. A comprehensive study of French Drama in English Translation (3) No foreign language credit. A

4110-30-33 French Literature of the Seventeenth Century (3, 3, 3) Prereq: Intermediate French or equivalent.


5710-20 Topics in Religious Thought (4, 4) (Same as Religious and Cultural Studies 5170). W

5720-30-40 Medieval French Literature (3, 3, 3) Medieval works in modern French texts. Prereq: Intermediate French or equivalent. A

4110-30-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent.

4120-30-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent.

4120-30-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent.

4000 Thesis (1-10) Only for A.M. students.

4350-02-03 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when thesis is student's primary activity. A maximum of 15 quarter credits of which 7 must be in courses numbered above 5000. Must be assigned to degree completion. May not be used toward degree requirements. May be repeated. May be repeated. May be repeated.

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of a M.A. program. Intensive study in a departmental area.

5101 Foreign Study (1-12) See page 104. E

5102 Off-campus Study (1-12) See page 104. E

5103 Independent Study (1-12) See page 104. E

5109-30-40 Old French (5, 5, 5) Medieval French language and literature. A

5110 College Teaching of Romance Languages (2) Seminars, observations, and practica in techniques and procedures of teaching and methods of examining, evaluating, and grading, cultural aspects and beginning literature. Required of all M.A. and Ph.D. students. Prereq: Graduate Teaching Associateships except those whose previous training or experience has been formally evaluated by department. F

5151-71 Bibliography and Methods of Research (1-3) Bibliography and research methods in French and Spanish. 5151-71 (L) Only. A
5850 American Women Writers (3) Feminine point of view, modern image of women, male-female relationships and society as context for women's literary achievement. Readings from poetry and fiction, including such authors as Anais Nin, Delia Aguirre, Gabriela Mistral, Silvina Ocampo and Rosario Castellanos. A

5850-60 Advanced Syntax and Stylistics (3, 3) Readings in the history of modern literary theory are interwoven in compositions, sketches, and original stories. A

5870 Problems in Linguistics: Romance Languages (3) Same as French 5870 A

5910-30-30 Spanish Lyric Poetry (3, 3, 3) Topics vary in field of Peninsular Literature. May be repeated with consent of department. A

5910-30 Seminar in Latin American Literature (3, 3) Topics vary. May be repeated with consent of department. A

Russian

Sociology

MAJOR

Soctology

Prerequisites:
D. M. Belz, Ph.D. Michigan State; J. D. Black, Ph.D. Michigan; E. E. Brooks, Ph.D. Indiana; D. E. Goddard, Ph.D. North Carolina; S. J. Goor, Ph.D. Illinois; D. G. Morrissey, Ph.D. Nebraska.

Associate Professors:

Assistant Professors:
S. L. Baker, Ph.D. Columbia; J. L. Davis, Ph.D. Stanford; C. J. Eshleman, Ph.D. Stanford; K. C. Kelly, Ph.D. Stanford; J. L. Radner, Ph.D. British Columbia; S. W. Wallace, Ph.D. California (Los Angeles); S. K. Fisher, Ph.D. California (San Diego); J. G. O. Ritter, Ph.D. Illinois.

The Department of Sociology offers programs leading to the Master of Arts and the Doctor of Philosophy degrees. For a full statement of departmental requirements, students are referred to the Department of Sociology, College of Arts and Sciences, The University of Chicago, 1120 East 58th Street, Chicago, Illinois 60637.

THE MASTER'S PROGRAM

The Master's degree may be obtained either as a thesis or as a 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

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.
2. Exclusive of doctoral research and dissertation, at least one-half of all credits shall be in courses numbered 5000 or 6000.
3. A written comprehensive examination covering sociological theory, research methodology, and two other areas in sociology must be passed prior to admission to candidacy. This examination must be passed not later than one academic year before the date on which the degree is granted.
4. No later than one month before graduation, 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.

All registration for 3000- and 4000-level courses requires the consent of the instructor.

4030 Sociology and Law (4) General treatment of social organizations and consequences of law and legal process, social structure of the legal system, social change, and structure and functioning of legal sanctions. Some attention is paid to law and legal processes 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.

4160 Theory of Attributes and Values (4) Organization, functioning, and measurement of attitudes, attitudes and value behavior, response latencies, approaches to attitude change, and relationship to attitudes and values.

4320 Urban Ecology (4) Examination of public, private, collective and individual spaces. Classical sociology of the city, its neoclassical reviews, social area analysis, and cognitive symbolic ecology emphasized.

4410 Educational Sociology (3) Same as Curriculum and Instruction 4410.

4500 Sociology of Aging (4) Critical analysis of issues and problems of the elderly; critical analysis of sociological research, not on the implementation of change.

4510 Criminal Justice I: Police and Courts (4) Critical assessment of sociological literature on the legal, police, and court systems. (Same as Political Science 4510.)

4520 Criminal Justice II: Corrections (4) Historical development of institutions and programs, juvenile training schools, prisons, probation, and parole. Analysis of operation and impact, evaluation research and application to correctional programs. Recommended prerequisite: 4510.

4530 Community Organization (4) Structure, function, leadership, and processes of interacting social groups. For students preparing a dissertation, a critical analysis of contemporary studies are reviewed and discussed. Emphasis on sociological research, not on the implementation of change.

4450 Development and Underdevelopment (4) Critical examination of theories which attempt to explain differential development in modern world. In depth examination of development theories and evaluation of the performance of countries and the world. (Same as Religious Studies 4450.)

4550 Forensic Sociology (4) Analysis of bureaucratic processes, division of labor, delegation of authority, and communications and paperwork under a system of rationality.

4570 Sociology of Aging (4) Role and status of those aged with age in relation to major social institutions, impact of public policy on the aged, psychological and social problems people have on society, effect of society on older people.

4620 American Minority Groups (4) Minority groups and social structure in American society; analysis of intergroup relations with attention given to both past and present relationships of selected groups to broader society.

4930 Sociology Movements (4) Development, organization, and functions of social movements; attention is given to the ideology, leadership and organization of religious, political and other types of social movements.

4940 Sociology of Religion (4) Interrelationship of society, culture, and religion. (Same as Religious Studies 4940.)

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

5100 Professional Seminar (3) Limited to sociology students. May be repeated. Maximum 9 hrs. S/N/C only. W, Sp

5210 Introduction to Sociological Theory (3) F

5230 Seminar in Sociology of Religion (3) May be repeated with different instructors. Maximum 6 hrs.

5300 Methods of Sociological Research (3) Assumptions and foundations of sociological research strategies and techniques.

5310 Seminar in Methods of Sociological Research (3) Major methodological issues in sociology: scaling techniques, reliability, validity, sampling, and quantitative methodology.

5330-30-30 Social Statistics (3, 3, 3) General survey of parametric and nonparametric procedures in analysis of sociological data: types of question, design of samples, procedures, advantages, disadvantages, and special characteristics of techniques. Must be taken in sequence. F, W

5400 Statistical Analysis in the Social Sciences I, II, III 1. Topics include multiple regression, analysis of variance, analysis of covariance, ordinal and nominal measures of association, sampling, significance tests, and confidence limits. Extensive use of social science computing packages.

5400-60 Statistical Analysis in the Social Sciences (3) Current and classical theoretical perspective in social psychology.

5460 Foundations of Social Conflict and Change (3)

5510 Delinquency and the Social Structure (3) Critically evaluate the contemporary theories of delinquency; research findings related to them, and their implications for formal strategies of control and rehabilitation.

5520 Crime, Law, and Social Control (3)

5630 Demographic Techniques (3) Life, table, standard, and survey techniques of population analysis.

5670 Seminar in Community (3)

5680 Historical Demography (2) Family reconstitution, historical population studies, and the interpretation of historical documentation containing information on population. Research findings on historical patterns of change in fertility, mortality, migration and different types of family structure.

5710 Seminar in Collective Behavior and Social Movements.

5720 Social Interaction (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to last selected theoretical problems. May be repeated. S/N/C only. E

5740 Seminar in Social Attitudes (3)

5810 Seminar in Race and Culture (3) Critical examination of conceptual and methodological approaches in study of intergroup relations. A
6670 Theory and Methods of Human Ecology (3) Prereq: 6580. Study of the relation of human ecology to general theories and processes of human social and cultural evolution and to the dynamics of urban society. May be repeated in any combination for a maximum of 9 credit hours.

6550 Urban and Regional Sociology (3) Prereq: Consent of instructor. Advanced social and demographic analysis of urban and regional social systems. May be repeated in any combination for a maximum of 9 credit hours.

6640 Seminar in Environmental Sociology (3) Prereq: 6630. Seminar on current problems in environmental sociology. May be repeated in any combination for a maximum of 6 credit hours.

6350 Field Research (3) Prereq: 6360-10 or consent of instructor. Field research practicum. Prereq: 6360-10 or consent of instructor. Field research practicum. Course may be repeated in any combination for a maximum of 18 credit hours.

6360 Field Research Practicum (3) Prereq: 6360-10 or consent of instructor. Field research practicum. Course may be repeated in any combination for a maximum of 18 credit hours.

5880 Seminar in Research Problems in Intergroup Relations (3) Research techniques and problems as encountered in the race and intergroup relations are explored; actual field research projects are performed.

5890 Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Relations between urbanization, industrialization, and modernization.

6000 Doctoral Research and Dissertation (3-15) P/ NP only. E.

6020 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychol. 6550.)

6040-41 Seminar in Class and Status (3) Major theoretical perspectives of social structure. Occupation, status, and social class. Their interaction in society. Prereq: 6470 or consent of instructor. May be repeated in any combination for a maximum of 6 credit hours.

5070 Socialization (3) Process of learning the rules, roles, and procedures for social control. Prereq: Consent of instructor. May be repeated in any combination for a maximum of 12 credit hours.

5080 Political Sociology (3) Prereq: Consent of instructor. Prereq: 5470 or consent of instructor. Political systems and forms of behavior of social worlds. Examination of the many major methods and the findings on class and status. Seminar on current position of theory. Prereq: 5470 or consent of instructor. May be repeated in any combination for a maximum of 6 credit hours.

5010 Perspectives in the Liberal Arts (3) Seminar on the humanities and fine arts to provide overview of research and current position of theory. Prereq: 5480 or consent of instructor. May be repeated in any combination for a maximum of 6 credit hours.

5030 Learning in the Liberal Arts (3) Seminar on cross-disciplinary approaches to human fertility and demographic problems. Consideration of relations obtained between economic, social, and demographic change in various parts of the world; fertility rates and reasons observed; controversies on control of infant and child mortality.

5830 Social Differentiation and Stratification (3) Various sources of differentiation in society, their relation to conflict in society, and their relationship to class structure in society.

5840 Seminar in Occupations (3) Occupations and their relation to individuals and society; technology and occupations; educational needs and occupational social organization and occupations.

5850 Seminar in Occupations (3) Continuation from material in Sociology 5840. Interface between occupations and settings in which they are performed.

5870 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5880 Seminar in Research Problems in Intergroup Relations (3) Research techniques and problems as encountered in the race and intergroup relations are explored; actual field research projects are performed.

5890 Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Relations between urbanization, industrialization, and modernization.

5970 Doctoral Research and Dissertation (3-15) P/ NP only. E.

5920 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychol. 6550.)

5940-41 Seminar in Class and Status (3) Major theoretical perspectives of social structure. Occupation, status, and social class. Their interaction in society. Prereq: 6470 or consent of instructor. May be repeated in any combination for a maximum of 6 credit hours.

5970 Socialization (3) Process of learning the rules, roles, and procedures for social control. Prereq: Consent of instructor. May be repeated in any combination for a maximum of 12 credit hours.

5980 Political Sociology (3) Prereq: Consent of instructor. Prereq: 5470 or consent of instructor. Political systems and forms of behavior of social worlds. Examination of the many major methods and the findings on class and status. Seminar on current position of theory. Prereq: 5470 or consent of instructor. May be repeated in any combination for a maximum of 6 credit hours.

5910 Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Relations between urbanization, industrialization, and modernization.

5920 Seminar in Occupations (3) Occupations and their relation to individuals and society; technology and occupations; educational needs and occupational social organization and occupations.

5950 Seminar in Occupations (3) Continuation from material in Sociology 5840. Interface between occupations and settings in which they are performed.

5970 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5980 Seminar in Research Problems in Intergroup Relations (3) Research techniques and problems as encountered in the race and intergroup relations are explored; actual field research projects are performed.

5990 Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization. Relations between urbanization, industrialization, and modernization.

6000 Doctoral Research and Dissertation (3-15) P/ NP only. E.

6020 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychol. 6550.)

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6080 Political Sociology (3) Prereq: Consent of instructor. Prereq: 5470 or consent of instructor. Political systems and forms of behavior of social worlds. Examination of the many major methods and the findings on class and status. Seminar on current position of theory. Prereq: 5470 or consent of instructor. May be repeated in any combination for a maximum of 6 credit hours.

6090 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in communities. Prereq: 5480 or consent of instructor.

5000 Spanish (3) Offered in Romance Languages.

Special Programs
5100 Perspectives in the Liberal Arts (3) Seminar on role of liberal arts in education from personal and regional perspectives.

5200 Inquiry in the Liberal Arts (3) Seminar on nature of evidence in social sciences, natural sciences, and humanities. Examination of the arts of inquiry, the processes and issues associated with scientific knowledge and decision making. Prereq: 5470 or consent of instructor.

5300 Learning in the Liberal Arts (3) Seminar on creative approaches to promoting liberal learning environment in classroom. Incorporation of use of "Great Books," critical thinking and creative problem-solving processes, values sensitivity, and other components.

5400-5401 Speech and Hearing Science (3) See Audiology and Speech Pathology.

Speech and Theatre
5000 Speech and Theatre (2) Prereq: Consent of instructor. Course may be repeated in any combination for a maximum of 6 credit hours.

5010 Perspectives in the Liberal Arts (3) Prereq: Consent of instructor. Course may be repeated in any combination for a maximum of 6 credit hours.

5020 Inquiry in the Liberal Arts (3) Seminar on nature of evidence in social sciences, natural sciences, and humanities. Examination of the arts of inquiry, the processes and issues associated with scientific knowledge and decision making. Prereq: 5470 or consent of instructor.

5030 Learning in the Liberal Arts (3) Seminar on creative approaches to promoting liberal learning environment in classroom. Incorporation of use of "Great Books," critical thinking and creative problem-solving processes, values sensitivity, and other components.

5040-5041 Speech and Hearing Science (3) See Audiology and Speech Pathology.
No more than 6 hours in projects

(3) May be repeated. Maximum 9 hrs. E

5110 Introduction to Graduate Research in Speech and Theatre (3) Graduate credit available to Theatre MFA students only.

5140 Communications Theory (3) Analysis of the nature of communication and the role of communication in society. Prereq: Consent of instructor.

5440 Organizational Communication (3) May be repeated. Maximum 8 hrs. F

5700-670 Studies in Rhetoric (3, 3, 2) Courses offered as needed. See Curry Course Catalog for topic, W, Sp

5911 Directing the Forensic Program (4) Philosophy and methods of directing conciliatory and extracurricular forensic activities in high schools and colleges: competitive and noncompetitive approaches in debating, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911.) Prereq: Consent of instructor.

5970-670 Studies in the Thespian Arts (3, 3, 3) W

Approval of the faculty constitutes entry into the third year. Thesis and oral defense (Theatre 5900, 9 hours minimum) must be completed satisfactorily before the degree is conferred.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a Master's or a doctoral degree may apply up to 15 credit hours from the previous graduate program to the MFA degree with approval of the student's committee, the Dean of the College of Liberal Arts, the Dean of The Graduate School. Such credits applied from a previous graduate program would be courses that are directly relevant to the student's MFA curriculum, and must have been earned within the time limits (6 years) established for completion of the MFA degree.

Speech

4222 Advanced Argumentation and Debate (4) Prereq: 2331 or consent of instructor. Sp

4421 Quantitative Research Methods in Speech Communication (3) Designing experiments, planning field studies, using statistical analysis.

4451 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory: contemporary approaches to criticism of public address. Recommended: 2111.

4520 Rhetoric of the Woman's Rights Movement (4) An overview of major topics and major public addresses in campaigns for women's rights from the 1830's to pre-1921.

5211 British Oratory (4) Historical and critical study of British public address. Pr: A

5921 Persuasive Uses of Imaginative Literature (4) Topics as social and political uses of novels, plays, and poetry. W

5411 Advanced Phonetics (4) Phonetic aspects of contemporary dialects of the English language. Prereq: Consent of Instructor. Sp, A

4920 Studies in American Public Address (4) May be repeated. Maximum 12 hrs.

4998 Colloquium in Speech Communication (1) May be repeated. E

5010 Research in Speech Communication (3) Survey of methods and representative studies in speech communication.

5140 Communications Theory (3) Analysis of complex theories of human communication, as well as the effects of communication on individuals and mass communication systems. F

5310 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs. Sp

5210 Quantitative Projects in Speech Communication (3) May be repeated. Maximum 9 hrs. E

5640 Organizational Communication (3) May be repeated. Maximum 8 hrs. F

5510-60-70 Studies in Persuasion (3, 3, 3) W

5700-670 Studies in Rhetoric (3, 3, 2) F

5711 Directing the Forensic Program (4) Philosophy and methods of directing conciliatory and extracurricular forensic activities in high schools and colleges: competitive and noncompetitive approaches in debating, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911.) Prereq: Consent of instructor.

5000 Thesis (1-15) PAP only. E

5002 Non-Thesis Graduation Completion (3-15) Required of the non-thesis student not otherwise registered during any quarter when such a student registers at the request of the faculty to complete degree requirements. May not be used to meet degree requirements for the MFA degree. May be used to meet degree requirements for the MFA degree.

5110 Introduction to Graduate Research in Speech and Theatre (2) May be repeated. Maximum 9 hrs. E

5180 Theory and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. May be repeated. Maximum 8 hrs. W, Sp

Theatre

3214-15 Technical Theatre (4, 4) Special techniques and equipment problems in production of major Theatre MFA productions; stage management: problems in basic technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

3221-22 Introduction to Scene Design (4, 4) Prereq: 3321-22. Principles in stage design with reference to style, movement, form, space, scale, color, and line. Elements of stage design. Preparation of scenic rendering. May be repeated. Graduate credit available to Theatre MFA students only.

3232-33 History of the Theatre (4, 4) Drama in performance with particular emphasis on theatre architecture, scene design, and acting styles. Act 3521-3221. Prereq: 3322-3331. May be repeated. Graduate credit available to Theatre MFA students only.

3241-42 History of American Theatre (3, 3) Development of theatre as social institution in American life. Prereq: 3222-3331. May be repeated. Graduate credit available to Theatre MFA students only.

3511-12 Introduction to Costume Design (4, 4) Costume as an expression of character on stage, the application of costume history to specific design projects. Prereq: 3321-3331 or consent of instructor. Graduate credit available to Theatre MFA students only.

4312-34 Special Problems in Acting (2, 3) Advanced investigation of acting in specific plays. With permission of instructor. Prereq: 3221-22 and consent of instructor. F, W

4214-15 Advanced Technical Theatre (4, 4) Advanced technical theatre; preparation of major Theatre MFA productions; technical theatre management; advanced scenery and property execution; special problems in technical theatre. F, W

4314 Advanced Scene Design (4, 4) Prereq: 3241-3211. Design techniques: historical and theoretical approaches. Prereq: 3321-3331. May be repeated. Graduate credit available to Theatre MFA students only.

4316 General Lighting Design (4, 4) General lighting production techniques: research and planning of stage lighting; techniques for production of major Theatre MFA shows. Prereq: 3221-3321. May be repeated. Graduate credit available to Theatre MFA students only.

4341-42 Advanced Lighting Design (4, 4) Advanced lighting production techniques: research and planning of stage lighting; techniques for production of major Theatre MFA shows. Prereq: 3221-3321. May be repeated. Graduate credit available to Theatre MFA students only.

4361 Advanced Stage Properties (4, 4) Advanced stage properties production techniques: research and planning of stage properties; techniques for production of major Theatre MFA shows. Prereq: 3221-3321. May be repeated. Graduate credit available to Theatre MFA students only.

4362-63 History of American Theatre (3, 3) Development of theatre as social institution in American life. Prereq: 3222-3331. May be repeated. Graduate credit available to Theatre MFA students only.
Ph.D. Iowa; J.N. Liles, Ph.D. Ohio State; K.W. Jeon, Ph.D. London (England); J.R. Kennedy, (Berkeley); E.T. Howley, Ph.D. Wisconsin; J.H. Abel (Head), Ph.D. Brown; R.M. Bagby, Ph.D. Illinois; D.L. Bunting, Ph.D. Oklahoma State; J.G. Carlson * (Emeritus), Ph.D. Pennsylvania; A.C. Echternacht, Ph.D. Kansas; D.A. Etnier, Professors: Zoology

MAJOR DEGREES

See Audiology and Speech Pathology


5900 Project and Thesis (1-4) Available to Theatre M.F.A. students only. Prereq: 40 hrs toward MFA and approval of advisor. May be repeated. Maximum 12 hrs. S/NCR only.

Speech Pathology

See Audiology and Speech Pathology

Zoology

MAJOR DEGREES

Zoology

U.S., Ph.D.

Professors: J.M. Haddad (Emeritus), Ph.D. Brown, R.M. Bagby, Ph.D. Michigan; D. O. Lichtenstein, Ph.D. Oklahoma State; C. A. Shivers, Ph.D. Michigan State; A. C. Echternacht, Ph.D. Kansas; A. C. Etnier. Ph.D. Florida; G.L. Whitson, Ph.D. Iowa; J.G. Kennedy, Ph.D. Iowa; J.N. Liles, Ph.D. Ohio State; J.A. McCaffrey, Ph.D. California (Drew); P. J. Roehrich, Ph.D. Wisconsin; A. P. Kassem, Ph.D. California (Stanford); T. T. Chen, Ph.D. Florida; D. F. McCracken, Ph.D. Cornell.

Associate Professors: A.C. Etnier, Ph.D. Illinois; J. D. H. Jones Hopkins; J. S. Pemble, Ph.D. Rutgers; A.C. Etnier, Ph.D. Illinois; D. R.虆, Ph.D. Pennsylvania; Z. E. Pomer, Ph.D. New Mexico State; A. Kramer, Ph.D. Duke; M. C. Whitaker, Ph.D. Indiana.

Adjunct Professors: J.M. Haddad, Ph.D. Cornell.

The Department of Zoology offers the Master of Science and Doctor of Philosophy degrees with concentrations in aquatic biology, ecology, cell biology and molecular biology, physiology, genetics, ethology, and reproductive and development or dissertation. 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 hours; (2) upper division zoology, 18 quarter hours; (3) chemistry, two years including 12 quarter hours of general inorganic; (4) mathematics, 9 quarter hours including differential and integral calculus; (5) physics, 12 quarter hours; (6) mathematics, 9 quarter hours. In addition to the above requirements, students may be admitted on the basis of (a) graduate study; (b) professional experience; or (c) equivalent course work.

The doctoral program consists of the following courses: (1) comprehensive examination; (2) the candidates for an advanced degree in Zoology must exhibit competency in six areas of zoology as determined by a qualifying 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 the two-year period for a student to continue in the program. 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

Subject requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee; (2) the comprehensive examination will be oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a substantial 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 the third quarter of a language course. This requirement for the first language must be fulfilled before the student can take the comprehensive examination. The student's faculty committee may require the student to have a second or proficiency in a foreign language but may not require that the student take the official language examination in the second language.

3050 Comparative Vertebrate Entomology (4) Developmental morphology of selected vertebrates. 2 hrs and 3 labs. Sp.

3060 Comparative Vertebrate Anatomy (5) Physiology and anatomy of organ systems. Organs share and can only be used in the 3rd year. 3 hrs and 2 labs. Sp.


3110 General Entomology (5) Introduction to insects: body structure, development, behavior; classification of insect orders; insect life cycle and adaptation; and use of keys. Prereq: Biology 3100 or consent of instructor. 3 hrs and 2 labs. F.

3150 Invertebrate Zoology (5) Biology of inverte- brates (except insects) with emphasis on ecology and behavior. Prereq: Biology 3100. 3 hrs and 2 labs. W.

3200 Physiology of Reproduction (3) Same as Animal Science 3202. F.

3210 Histology (4) Study of animal tissues. Prereq: Biology 3100. 5 hrs. F; Sp.

3410 Bioethics (3) Relationship between biological discoveries and human values. Open discussion of selected dilemmas arising from new knowledge about medicine, behavior, reproduction, and technology. Sp.

4040 Museum in Zoology (5) Weekly lecture on advanced topics in zoology, concentrated in time and topic during the 3rd quarter of the year. Prereq: Consent of instructor. 3 hrs and 4 labs. F.

4050 Developmental Biology (4) Experimental mor- phology, cellularization, intercellular movements and related topics with emphasis on cell proliferation and morphology. May be repeated. 4 hrs and 3 labs. W.

4100 Undergraduate Research Participation (2) Expe- rience in active research projects or supervised by staff members. Prereq: Consent of instructor. E.

4120 Practicum in Zoology (1-9) Practicum in par- ticipation and preparation of animals in community, field, or laboratory. May be repeated for credit not to exceed 10 credits over a period of 3 yrs. Prereq: Consent of instructor. 1-9 hrs. Prereq: Consent of instructor. 1-9 hrs. E.

4150 Colloquium (1-3) Seminar for graduate students to meet periodically and discuss selected topics in zoology. 1-3 hrs. F.

4400 Scholastic (5) Classification, collection, identifi- cation. 5 hrs. Prereq: Consent of instructor. 2 hrs and 3 labs or field periods. F; W.

4401 Cell Physiology (4) Development of modern con- cepts in cell physiology from point of view of information and control which examines kinetics and integration of cellular activities. Prereq: Biology, or any phys- ical science, or consent of instructor. 4 hrs. Coreq: Biochemistry. 3 hrs and 1 lab. Sp.

4402 Animal Physiology (4) Physiological mech- anisms in animal kinematics and methodologies to animal physiology and to survival of animals in diverse environ- ments. Prereq: Biology 3100-30. 3 yrs chemistry. W
4250 Comparative Animal Physiology Laboratory I (3) Coreq: 4270. W
4260 Comparative Animal Physiology II (6) Sensory effectors and integrative physiology. Prereq: 3900. Sp
4265 Comparative Animal Physiology Laboratory II (1) Prereq: 3900 and consent of instructor. Coreq: 4266. Sp
4270 Immunology (3) (Same as Microbiology 4270.)
4300 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands. Prereq: Biology 1310. Coreq: 4302. W
4320 Comparative Invertebrate Physiology (5) Comparative analysis of the physiology and morphology of endocrine glands in invertebrates. Their role and interaction in maintenance of the organism. Prereq: 4300 or equivalent. W
4326 Herpetology (4) Classification, distribution, the herpetofauna, collection and identification of amphibians and reptiles, primarily of local species. 2 hrs and 2 labs or field periods. Sp
4329 Ornithology (4) Morphology, physiology, behavior, reproduction, populations, evolution, fate identification, 2 hrs and 2 labs and field periods. Sp
4335 Microtechnique (4) Prereq: 3320 recommended. 2 hrs and 2 labs. W
4350 General Cytology (4) Study of cellular organs on the light and electron microscopic levels and the function of these organs. Prereq: Biology 3110. Sp
4351 Human Genetics (3) Principles and problems of inheritance in humans. Sp
4410 General Parasitology (4) Morphology, taxonomy and ecology of parasitic worms and protozoa, with emphasis on helminths. Prereq: Biology 1310. Coreq: or consent of instructor. 3 hrs and 1 lab. W
4450 Introduction to Aquatic Ecology (4) Physico-chemical nature of inland waters. Biotic communities are described, interrelationships explored. Prereq: Chemistry 1110-20, Biology 3130. 3 hrs and 2 labs. F
4470 Anrochology (4) Biology of watersheds, rivers, scoria and lake reserves. Prereq: 3110 or 3130. 2 hrs and 2 labs. W
4475 Comparative Animal Behavior (6) Methods and principles. (Same as Psychology 4720.) F
4478 Comparative Animal Behavior Laboratory (4) Laboratory methods. Coreq: 4475. (Same as Psychology 4726.) F
4480-40,4810 Insect Morphology and Taxonomy (4, 4) Insect—intermediate morphology of both generalised and specialised forms. 4810—Taxonomy of major orders. 4880—Taxonomy of major orders and intermediate forms. Prereq: for 4810-4815: 3110 or consent of instructor. 2 hrs and 2 labs. W, F, Sp
4540 Physiology of Exercise (4) Functions of body in muscular work; physiological aspects of fatigue, training, and physical fitness. Prereq: 2520-2580 or 3080. 3 hrs and 1 lab. F, Sp
5000 Thesis (1-5) PNP only. E
5017 Colloquium in Ethology (1) (Same as Psychology 5017.) S
5050 Zoology Seminar (1) Advanced topics or controversial issues in zoology. May be repeated. Maximum 6 hrs. As senior Zoology majors encourage. Required of all first- and second-year graduate students. 1 hr. F, W, Sp
5075 Zerplankton Ecology (4) Secondary productivity in aquatic systems. Prereq: 4690 or equivalent. Sp
5090 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students. In good standing. Prereq: Content of department and research director. May be repeated with consent of department. SNC only. E
5110-20-30 Special Problems (2, 2, 2) E
5150 Zoological Bibliography (1) Methods of locating and using zoological literature, bibliographies, and abstracts, and of preparing bibliographies and scientific papers.
5180 Fresh Water Intervertebrate Zoology (4) Ecology, taxonomy and laboratory of fresh water invertebrates as well as relationships with other members of the faunistic community. Laboratory and field study. Prereq: 3130. W
5270 Advanced Neurovascular Physiology (5) Cellular and molecular aspects of animal physiology, primarily as related to control of muscular movements and cardiovascular function. Prereq: 4270. 2 hrs and 3 labs. W, A
5290 Quantitative Problems (4) Prereq: as Geology 5220 and Botany 5230. W
5300 Biometry (3) Statistical methods used in analysis of biological data. Prereq: 1) registration or consent of instructor. F
5309 Isotopic Methods and Techniques: Lecture (2) Theory of isotopic decay, measurement of isotopic decay by liquid scintillation counting, single and double isotope counting, counting and measurement using Cerenkov radiation, principles of carbon-14, phoswich counting, half-life measurement, measurement of isotope in mammalian tissues, experimental design and data analysis. Prereq: 4810. 1 hr in general chemistry or consent of instructor. 2 hrs and 3 labs. W, A
5389 Isotopic Methods and Techniques: Laboratory (4) Use of liquid scintillation counter, optimum conditions for single and double isotope counting, counting and measurement using Cerenkov radiation, procedures for measuring blood components and cell count, measurement of isotopes of inorganic and organic components of living organisms. Prereq: 4530. Prereq: Graduate standing and one upper division laboratory course in other discipline, physiology, biochemistry, microbiology, or consent of instructor. F
5390 Isotopic Methods and Techniques: Laboratory (4) Use of liquid scintillation counter, optimum conditions for single and double isotope counting, counting and measurement using Cerenkov radiation, procedures for measuring blood components and cell count, measurement of isotopes of inorganic and organic components of living organisms. Prereq: 4530. Prereq: Graduate standing and one upper division laboratory course in other discipline, physiology, biochemistry, microbiology, or consent of instructor. F
5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.
5510-20 Advanced Animal Physiology (5, 5) Primarily mammalian physiology, 5510—membranous, cardiovascular, respiratory, and renal physiology, 5520—acid-base balance, endocrine, and gastrointestinal physiology. Prereq: 4280. 5510—Recommended prerequisite. Biochemistry 1110 and departmental consent of instructor. (Same as Animal Science 5510-20.) 4 hrs and 1 lab. W, Sp
5570 Animal Populations (3) Characteristics and methods of study of animal populations.
5600 Physiology of Development (2) Chemical aspects of growth, morphogenesis, reproduction, and other processes. Prereq: Chemistry 4120-20. W
6310 Seminar in Cytology (2) May be repeated. Maximum 6 hrs. F
6350 Seminar in Aquatic Biology (2) Prereq: Any 4 of 4300, 4560, Botany 5051, or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.
6410 Seminar in Cytology (2) May be repeated. Maximum 6 hrs. F
6730 Population Biology (4) Ecology and genetics of plant and animal populations. Prereq: Biology 3110 and 3130. (Same as Botany 5730.)
6740 Physiological Ecology of Animals (3) Physiological response of plants and animals to changes in the environment, emphasis on terrestrial vertebrates. Term paper including review of assigned topic with emphasis on current ecological literature. 1 hr per sec. Sp
5710 Physiological Ethology (3) Behavioral neurology and neurobiology from ethological perspective, reciprocal relationships of physiology and behavior in natural context. Prereq: Consent of instructor, or Psychology 5740, or undergraduate course in physiology. W
5740 Graduate Behavior Ecology (4) (Same as Psychology 5780.)
5790 Transport of Ions Across Epithelia (4) Operative principles and methods needed to study electrical and motoric properties of epithelia, and electrically excitable tissues. Quantitative methods of measuring ion fluxes and flux ratios. Prereq: Two upper-division physiology courses, graduate standing, or consent of instructor. Recommended prerequisite: Chemistry 6310.
5820 Methods of Taxonomy (4) Classification of animal kingdom, types of nomenclature, problems in nomenclature, preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W
5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp
5860 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.
6010 Doctoral Research and Dissertation (1-15) Prereq: May be repeated. Maximum 6 hrs.
6110 Advanced Topics in Cell and Molecular Biology (4) Reading and discussions of recent advances in cell biology. Prereq: Biology 3130 and consent of instructor. May be repeated with consent of department. Maximum 12 hrs.
6210 Seminar in Physiology (2) Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.
6310 Seminar in Cytology (2) May be repeated. Maximum 6 hrs.
6350 Seminar in Developmental Biology (2) Internal development and differentiation cells. Prereq: 4300, 4350, Botany 5051. W
6610 Seminar in Genetics (3) Prereq: General genetics completed. Maximum 6 hrs. F
6810 Seminar in Ornithology (2) Prereq: 4300. May be repeated. Maximum 6 hrs. W
6550 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4300, 4560, Botany 5511, or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.
6710 Seminar in Ecology (2) Prereq: Consent of instructor. Maximum 6 hrs.
6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
Robert L. Summitt, Dean

The major campus of the College of Medi-
cine is located in Memphis, Tennessee. The
College, however, is a statewide organiza-
tion with other units in Chattanooga,
Jackson, and Knoxville.

In addition to Department of Medical Biol-
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